

IN 10 VOLUMES

ENCYCLOPAEDIA OF
**WORLD
& PEOPLE**



HAROLD SHELTON G K BUCKNALL

**ENCYCLOPEDIA OF
WORLD AND PEOPLE**

ENCYCLOPAEDIA OF WORLD AND PEOPLE

(In 10 Volumes)

(Volume -6)

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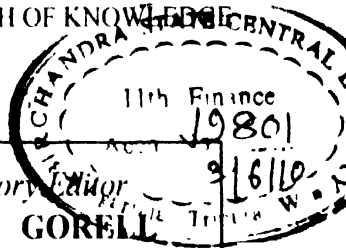
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LIST OF INSETS

VOLUME VI

SOME OF THE MOLLUSCS	<i>facing page</i> 2810
SCENES IN MONACO	2812
MOUNT EDITH CAVELL	2886
THE BATTLE OF JUTLAND	2964
A FARM IN HOLLAND	2996
NEW ZEALAND—MAP	3028
NORTH AMERICA—MAP	3062
NORWAY AND SWEDEN—MAP	3080
SOME OF THE ORCHIDS	3162
IN THE PACIFIC ISLANDS	3210
"THE CARD PLAYERS" BY VAN LEYDEN	3216
REMBRANDT SELF-PORTRAIT AND "THE LAUGHING CAVALIER" BY FRANZ HALS	3218
"THE WINDMILL" BY RUYSDAEL	3220
"MISTRAL" BY RENOIR	3224
PALESTINE—MAP	3230
SOME OF THE PERENNIALS	3326
EXAMPLES OF PERSIAN ART	3336

THE WORLD BOOK

VOLUME

SIX

MISSOURI, RIVER. An American river. From its source to its junction with the Mississippi, it is 2945 miles long, while the length of the combined rivers, from the source of the Missouri to the mouth of the Mississippi, is 4200 miles. See **MISSISSIPPI, RIVER.**

MIST. See **FOG.**

MISTLETOE. A parasite on the trunks and branches of various trees. Contrary to popular belief, the common European mistletoe is rarely found on the oak.



MISTLETOE
Photo E. J. Hosking

Most commonly, the apple tree serves as the host, but mistletoe grows also on the hawthorne, sycamore, lime, poplar, fir, and other trees (see **PARASITE**). It is an evergreen and has thickly clustered leaves and tiny yellow flowers, which later give place to white berries. The berries have a viscous and sticky pulp and contain seeds. When the berries are eaten by birds, the sticky pulp causes the seeds to adhere to the bird's bill, which he cleans on the tree bark, at the same time "planting" the seed.

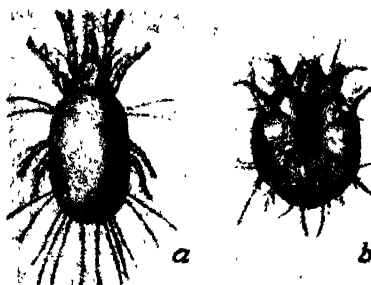
According to tradition, mistletoe was considered a sacred and ritual plant by the Druids. It is possible that this ceremonial use is the origin of the Yuletide customs connected with it.

Scientific Names. The mistletoe family is *Loranthaceae*. The European mistletoe is *Viscum album*.

MISTRAL. A strong, cold north-west wind,

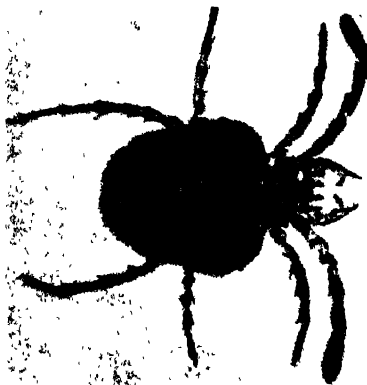
prevailing in the winter along the Mediterranean coast from Genoa to the mouth of the Ebro. It is formed by the downrush of cold dry air from the southern slopes of the Alps through the valley of the Rhône, and is very destructive to fruit trees.

MITES. A name applied to various minute members of a parasitic order of animals



MITES
(a) Cheese mite. (b) Itch mite (under side).

belonging to the same class as spiders, scorpions and ticks. With ticks, mites form the order *Arachnida* (which see).



AMERICAN RED EARTH MITE
Photo: Visual Education Service

Many of the mites are microscopic, and nearly all are too small to be readily detected with the naked eye. The typical adult mite

has a sac-like body without a perceptible division of abdomen and thorax, and four pairs of legs. The mouth parts are modified to form piercing and grasping organs, and the digestive system begins in a sucking beak. In most species, six-legged larvae hatch from eggs; these moult and change into nymphs, which have eight legs. After one or more additional moultings, the nymphs change into adults.

Over half of the mites live for all or part of their lives as parasites. They are found on land and in water, and they feed not only on the fluids and tissues of living plants and animals, but on feathers, cheese, flour, cereals, drugs, and other stored products. There are several species that burrow into or live on the skin of man and other mammals—especially horses, cattle and sheep—and cause the eruptions known as itch, scab and mange. See TICK.

Scientific Names. The burrowing itch mite of man is *Sarcoptes scabiei*. Horses are attacked by a variety of this parasite. *Psoroptes communis* lives in colonies on the skin of horses, cattle and other domestic animals. All of these mites are susceptible to sulphur preparations. The chicken mite is *Dermanyssus gallinæ*. The red spider of greenhouses is *Tetranychus bimaculatus*. Cheese mites belong to the family *Tyroglyphidae*.

MITHRAS. A divinity worshipped in the Indo-Iranian period, the worship being known as Mithraism. While primarily found in India and Persia, Mithraism was widely diffused both in the Greek and Roman worlds. The central features of the Mithraistic myth are the ritual of initiation and the sacrifice of the bull. The enormous development of Mithraism in the Roman Empire in the third and fourth centuries might well have led to its establishment as a world religion.

MITHRIDATES, *mith rid ay' lee* (135-63 B.C.). King of Pontus, in Asia Minor. Through his antagonism toward and revolt against the Roman imperial system, the fires of insurrection were kindled as far westward as Greece. To secure his power in Asia, he ordered a massacre of the Romans, and it is estimated that from 80,000 to 150,000 perished. Later he sent an army into Greece, but after waging two wars, was forced to make peace with Sulla, the Roman dictator. The third Mithridatic war was waged under Pompey's leadership. Aided by an alliance with the king of Parthia, Pompey drove Mithridates beyond the Caucasus Mountains. Mithridates began to plan an invasion of Italy, but his son Pharnaces rebelled against him, and he died by his own hand.

MITRAL VALVE. See HEART.

MITRE (ECCLESIASTICAL). A liturgical head-covering, originally limited to the use

of bishops in the Church, but since the middle of the eleventh century used also by cardinals and abbots.

It is a tall tongue-shaped cap, which can be folded and has two lappets hanging from the back. Its origin does not appear to be earlier than the tenth century. It seems to be derived from a head-dress worn by Popes in solemn processions.

MIXED METAPHOR. See METAPHOR.

MNEMONICS, *ne mon' iks*. The science of strengthening and assisting the memory.

Mnemonics as an art was known to the ancients; the first teacher is said to have been Simonides of Ceos in the fifth century B.C., who evolved a definite system of instruction, highly praised by distinguished critics such as Quintilian and Cicero.

It is agreed that memory functions when an idea or image previously impressed on the mind is recalled. Obviously, therefore, it is necessary to fix the attention when the original idea is being planted in the mind, and so an effort of will is necessary. Otherwise no lasting impression is formed. The exercise of this faculty, and its development, is the first and most important part of any system of mnemonics.

When a clear impression has been made, it is recalled by an "Association of Ideas." These two factors, attention and association, are thus the keystones of the science.

The Association of Ideas. Ideas are associated in the mind in accordance with a number of fixed laws. The traditional classification of these is as follows—

1. Contiguity of space or time.
2. Cause and Effect.
3. Similarity.
4. Contact.

It is held that every single idea is remembered by reference to one or other of these principles or relations. Sometimes the connection is conscious. When we think of rain, the mind naturally turns to umbrellas; when we visit a certain place after a long period, the mind recalls the events which occurred during our last visit. More often we are unconscious of the connection. The purpose of this branch of mnemonics is to assist in forming these connections, for the more vividly the connection of any two ideas is perceived, the more easily they are remembered.

MNEMOSYNE, *ne mos' in e*. The mother of the Muses (which see).

MNEVIS, *ne' vis*. The sacred bull worshipped by the ancient Egyptians at Heliopolis. It was regarded as an incarnation of the sun-god Ra.

MOA, *mo' a*. The name of a group of large flightless birds that lived in New Zealand

until five to seven centuries ago. From fossil remains, scientists have identified a number of genera and species.

The moas differed greatly in size, some being as small as turkeys, others reaching a height of over 12 ft. The moa had a small head, a long neck, and massive hind limbs. Wings were either absent or undeveloped. Moas were related to the *apteryx* (which see).

MOABITES, *mo' ab ites*. A tribe who, in Biblical times, lived in the territory at the south-eastern end of the Dead Sea, in a district now known as El Kerak, Syria. By tradition they were descended from Moab, a son of Lot.

MOABITE STONE. An ancient stone bearing one of the earliest inscriptions in Hebrew-Phoenician characters. It is of black basalt,

and is about 3 ft. 8 in. high, and 2 ft. 3 in. wide. It was discovered in 1868 by F. A. Klein, a missionary at Diban, in Moab. Arabs, angered by French efforts to acquire the stone, broke it in pieces. Fortunately, it was possible to collect the fragments and to make a translation of the thirty-four-line inscription, which dates

from the ninth century B.C. The restored stone, now in the Louvre in Paris, records the deeds of Mesha, the Moabite king, describes his wars with Omri and Ahab, kings of Israel (see II Kings, iii. 4-27), and in part refers to Mesha's building operations.

MOAT. A ditch around the ramparts of a castle or fortified dwelling-house.

MOBILIZATION, *mo' bil i zay sh'n*. The process of passing from a peace to a war footing in men, arms, equipment and stores. In peace time, for reasons of economy, the fighting services are not maintained at war establishment in ships, guns, men and stores, but are prepared for war by the addition of *wa. outfit*; the *calling up of Reserves*, of ships and aircraft, officers and men; and the completion of war establishment from *mobilization store*, or by *purchase or requisition* in arms, ammunition, vehicles, clothing and stores. Mobilization may be *general*,

affecting Navy, Army and Air Force, or of the whole Regular Army, or partial. The Territorial Army (which see) is first "embodied" before mobilization.

MOC'CASIN. The traditional footwear of the North American Indians. It is made in one piece, usually from deerskin. It is thus warm, light and hard wearing.

MOCCASIN SNAKE. An American snake, related to the copperhead. The mouth, when wide open, shows white in contrast to the general dark-brown colour of the body, and



MOCCASIN SNAKE

Photo Visual Education Service

has led to the snake being given the name of *cotton-mouth*. On its sides are dim, blackish bars, and its black abdomen is marked with spots of yellowish-white. The body is 4 ft. in length, and the tail is about 7 in. long. It is found in large numbers in swamps and marshy regions of the U.S.A. and South America. Its bite is poisonous. The true water moccasin, which much resembles it in appearance, is also venomous.

Scientific Names. The moccasin snake belongs to the pit viper sub-family *Crotalinae* of the family *Viperidae*. It is known as *Ancistrodon cottonmout*. The water moccasin is *A. piscivorus*.

MOCKING BIRD. An American bird, famous not only for the quality of its own song, but also for its singing notes and its ability to imitate the sounds of other birds.

An ashen-grey coat, darker wings and tail, white outer tail feathers, and grimy-white breast constitute its colouring. The bird is from 9 to 11 in. in length. Its scientific name is *Mimus polyglottos*.

MOCK ORANGE. A deciduous hardy shrub, native to America and prized in British gardens for its scented, creamy-white flowers borne in summer. It flourishes in



MOABITE STONE



MOCKING BIRD

Photo: Visual Education Service

ordinary soil. The name is derived from the resemblance of the perfume to that of orange blossoms.

Scientific Name. *Philadelphus coronarius*, of the family *Saxifragaceae*.

MODEL MAKING (MODEL ENGINEERING). Reproduction in miniature of full-size objects, calling for a degree of skill and craftsmanship according to the faithfulness with which the prototype is modelled. Models dug up during excavations in Egypt and elsewhere have shed much light on the habits and lives of the early Egyptians and other tribes. To-day model making is popular throughout the world, thousands of people devoting their leisure hours to it and thousands depending for their livelihood upon it.

Uses for Models. Models have many practical uses, among which may be mentioned the following: lectures accompanied by model demonstrations; the presentation of scientific progress by means of models in museums; the development of inventions, the calculation of aircraft performance by scale models subjected to wind tunnel tests; the training of young men in the principles of flight; the training of sailors in signalling and the identification of vessels; the adver-

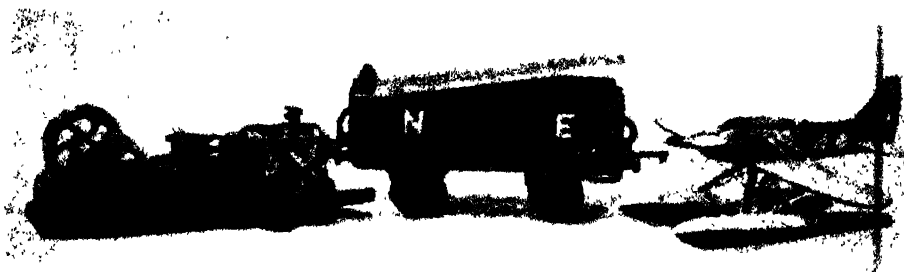
tising of goods in shop windows; the obtaining of "faked" cinematograph pictures; architects' models, etc.

Professional Model Making. Innumerable firms specialize in models and model accessories representing all kinds of engineering subjects. It is possible to buy models in the finished state, or with rough parts, accompanied by full instructions for assembling. Aeroplane models are very popular and most of them reasonably cheap. The more expensive examples have working petrol engines, by the aid of which amazing altitudes and duration of flight have been obtained. Accessories of infinite variety are sold for amateurs who cannot or do not wish to make certain parts, and there is an unlimited choice of tools. Castings, etc., are made to special order.

Amateur Model Making. To the novice, "Do not be too ambitious at first" is good advice. Start on a small, simple model and then, if satisfied, try something larger. Bear in mind the tools available or likely to be available, and consider carefully the choice of a model. If interest is to be retained, the prototype should be one in which you have a real interest, and preferably one open to inspection if desired.

Wood is the easiest material to work, but many engineering models call for metal working partially or totally. Novices in metal work would do well to start the workshop with a bench, vice, hammer, pliers, soldering outfit, drill brace, drills, centre-punch, metal saw, files, cold chisel, calipers, square, scriber and steel rule. Further tools can be added as required, and perhaps eventually a small lathe, of which there are many types specially designed for model engineering and on which beautiful work can be done.

In connection with model engineering, always use the right material for the job; for instance, do not use brass where steel should be employed, and do not use screws instead of bolts. Also do not finish up by



MODEL ENGINEERING

Left to right: Horizontal mill engine, coal truck, racing seaplane.

Photo: Topical

immersing the model in a chromium vat, and beware of vivid and unnatural colour schemes.

Those interested in models are well aware of the valuable experience and skill in craftsmanship gained by model construction.

Museums and Exhibitions. Model enthusiasts would do well to visit the United Services Museum, the Science Museum (South Kensington), or the Bethnal Green Museum. The Science Museum is all-embracing and an inspiration to model engineers. The annual "Model Engineer" Exhibition (first

has been to elect a minister of the Church. The word itself indicates a mediator or umpire who is elected to preside over a meeting to reconcile, if necessary, conflicting points of view. In some of the older universities, officers who preside over certain examinations are known as Moderators.

MODULATION. In music, the art of passing from one key to another.

MOGUL, mo' gūl. The Arabic and Persian form of the word *Mongol*. See INDIA (History); MONGOLS.

MOHACS, mo' hahch, FIELD, BATTLE OF. See HUNGARY.

MO'HAIR. The hair of the Angora goat, a native of Asia Minor. Except in rare cases, the natural colour of mohair is white. It is very durable and is used in the manufacture of textiles which are subject to hard usage, such as the plush used to cover furniture and railway seats. *Camel's hair*, so called, is made from mohair of the best grade. Mohair is also of value in the making of wigs for theatrical purposes.

MOHAMMED, mo ham' ed, also known as MAHOMET and MUHAMMAD (about 570-632). The Prophet of Islam. A poor couple of the tribe of Kereish were his parents. Left an orphan when a young child, Mohammed was adopted by his grandfather, and when the latter died, by an uncle, Abu Talib. At the age of 25 he entered the service of a wealthy widow, Khadija, whom he soon married. Though she was fifteen years his senior, they lived happily together until her death in 619. Of their two sons and four daughters all died very young, except the beloved daughter Fatima.

Mohammed early showed signs of a deeply religious disposition, which was fostered during his caravan journeys by mixing with Jews and Christians, of whose tenets and history he gained some superficial knowledge. He also practised asceticism and solitary prayer.

In his fortieth year (A.D. 610), he claimed to have received, through the angel Gabriel, a divine revelation that he was to be a prophet of God. He then began his life-work in the dissemination of the doctrine which he asserted that he had received, and which is summed up in the short Mohammedan Creed: "There is no God but the true God, and Mohammed is the prophet of God."

About 612 he began to spread this belief publicly.

It was several years before he gained half a hundred followers outside his own family. This small group was subjected to such persecution that its members fled from Mecca to Medina in 622. This flight, or "Hegira," marks the beginning of the Mohammedan era. Mohammed established



THE "GOLDEN HIND"
An exact model of Drake's famous ship.
Photo: Topical

held in 1907) at the Horticultural Hall, Westminster, is exceedingly interesting, and both models and drawings can be entered in the competition section. A good model stands to win a silver cup, a medal and perhaps a photo in the "Dailies."

Model-Making Journals. Journals of interest to model makers are *The Model Engineer* (est. 1898), *English Mechanics*, and *Amateur Mechanics*.

Useful Clubs. For a small subscription, model engineers resident in London can join one of the following clubs: The Society of Model and Experimental Engineers; The Model Railway Club; The Model Power Boat Club; The Society of Model Aeronautical Engineers. Addresses can be obtained from the Editor of *The Model Engineer* (13-16 Fisher Street, Southampton Row, W.C.1). The last-mentioned club has affiliated clubs in various parts of England.

MODENA, mo day' na. See ITALY.

MODERATOR. The title of the officer of the Presbyterian Church who presides over the General Assembly, by whom he is elected. Formerly laymen were able to hold the office, but in recent times the practice

himself in Medina, where he rapidly gained many followers, and in 630 he and his disciples captured Mecca, overthrew the idols of the Kaaba, and extended his control over Arabia. In 632 he made a final pilgrimage to Mecca, now become the holy city, with 40,000 followers. He died of a fever contracted in the city at the age of 62. Differing estimates of the character of this great man have been put forward by his biographers. The earliest life of the prophet was not writ-

Empire. In 1909, the Young Turks deposed the thirty-fourth Sultan, Abdul-Hamid, and placed his younger brother Reshad upon the throne as Mohammed V. During his ineffectual reign, which comprised the period of the World War, he was unable to influence the course of events, and he died in 1918, a few months before the collapse of the Central Powers in which Turkey was involved.

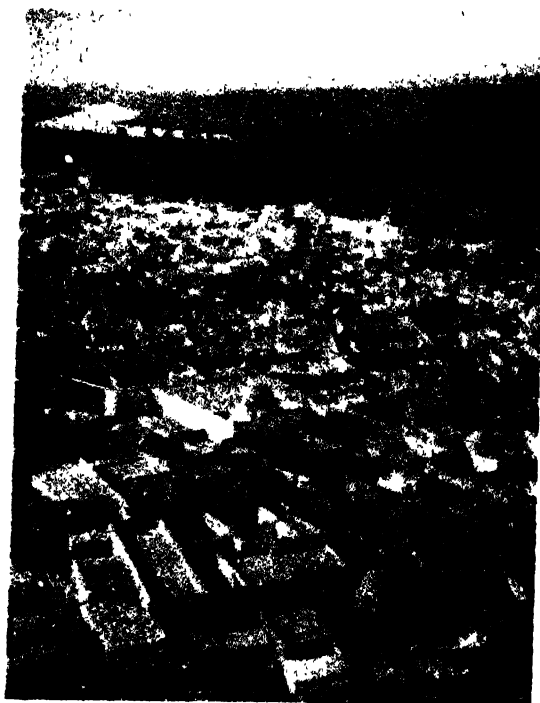
MOHAMMEDAN ARCHITECTURE. The Mohammedans, like most other people of their time, expressed their ideals of architecture in their churches and other sacred buildings; and the influence of Byzantine and Persian models is seen. A distinguished characteristic is the dome, developed by the Saracens; it was first built over tombs in sepulchral mosques, but later over the prayer halls, as in the famous Aska Mosque and Dome of the Rock, at Jerusalem. Because the religion of Islam forbade images of living things, the Mohammedans displayed their love of ornament and colour in elaborate geometric designs, which they used in friezes, borders and screens.

Religious needs brought about the invention of the minaret, which came to be an essential adjunct to the mosque; this is the tall slender tower, surrounded by one or more projecting balconies from which the muezzin calls the people to prayer. The Taj Mahal in India and the Alhambra in Spain are the finest examples of Mohammedan architecture. The Moorish tower of Seville Cathedral offers a remarkable contrast to the Cathedral itself, which is Spanish Gothic.

MOHAMMEDANISM, *mo ham' ed an iz'm*. The religion founded by Mohammed. Established six centuries after Christianity, it has now about 200,000,000 followers.

Mohammed called his religion *Islam*, and as taught by the Prophet himself, it was a combination of the teachings of Arabian heathenism, Judaism, Christianity, Zoroastrianism and other Eastern systems.

The teachings contained in the Koran, the bible of Islam, may be divided into the two groups, *faith* and *religion*, or works. The Koran teaches six cardinal dogmas—belief in the unity of God, in the existence of angels, in the Scripture, in the prophets, in resurrection and judgment, and in predestination. It also upholds the existence of jinns or genii, beings intermediate between angels and men and capable of corporeal



MOHAMMEDAN CEMETERY IN EGYPT
Photo: OROG

ten till 150 years after his death, and legendary matter and fictitious stories mar the records. When his character is disentangled from these factors, it seems to have been that of a man of nervous temperament, imaginative, on the whole compassionate, brave, austere pious, and, in the earlier part of his career, sincere. In his latter years, phenomenal success corrupted him, and his character deteriorated.

The teachings of Mohammed are contained in the Koran, which is a compilation in Arabic of his sayings and doctrine. See **MOHAMMEDANISM**; **KORAN**.

MOHAMMED V (1844–1918). The thirty-fifth Ottoman sultan of the former Turkish

actions. The future life for the good in Paradise is of a sensuous and materialistic nature, and the horrors of hell for the unbeliever or the unfaithful are fearfully depicted.

Among the prophets Christ is included, but not as the Son of God, and, together with all the other prophets, is considered inferior to Mohammed himself.

The Koran also teaches four cardinal works, namely, prayer, almsgiving, fasting, and a pilgrimage to Mecca. Prayers are to be said at five appointed times every twenty-four hours. They are preceded by ceremonial washings, and the kneeling-place must be clean, an ordinance which explains the use of the prayer rugs.

Fasting is required during the month of Ramadan, the ninth month of the Mohammedan calendar. At the end of the month, a feast of several days' duration is observed.

The pilgrimage to Mecca, the fourth duty required of the devout Mohammedan, makes him a *hajji*. The twelfth month is known as

wives is limited to four. Killing is forbidden in general, but in certain circumstances may be condoned or even advocated. The one



MOHAMMEDAN SCHOOL IN MOSQUE
Photo: Visual Education Service

who kills an infidel is splendidly rewarded in the life beyond the grave. Infidelity to Islam is to be punished by death. All those slain in what are called Holy Wars are martyrs, and obtain martyrs' rewards. The Koran forbids drinking of intoxicating liquors, gambling, taking of usury, and the making of an image of any living object, man or beast.

After Mohammed's death, in 632, his claims to spiritual and temporal authority were assumed by leaders who bore the title of caliph. A widely extended empire, or caliphate, was established through the conquests of the Moslems, and Syria, Persia, Egypt, North Africa, and Spain became strongholds of Islam. Between 632 and 750 there existed an Islamic world in which the ideal of unity was practically realized. In 750, however, the Mohammedan realm was divided, and rival caliphates waxed and waned in dominion and strength.

Those Mohammedans who acknowledge the first four caliphs as the rightful successors of Mohammed are known as *Sunnites*. The other division, whose members are called *Shiites*, consists of those who reject the first three caliphs and consider Ali, the husband of Mohammed's daughter Fatima, as the true successor of the Prophet.

See HADJ, MECCA; MEDINA, etc.

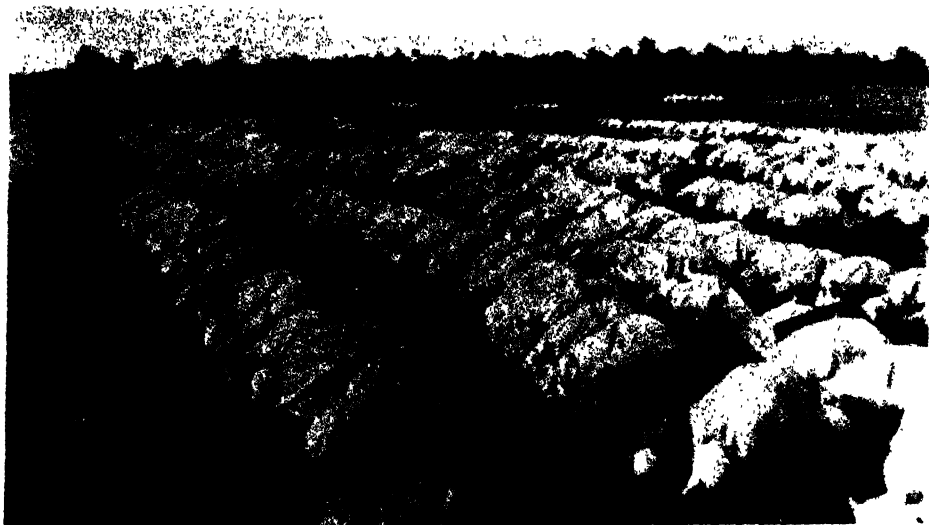


WELL IN GRAND MOSQUE, ALEPPO
Devout Moslems preparing to wash their feet before prayer.

Photo: OROC

the special month of pilgrimage, though it may be made at other times.

Polygamy is allowed, but the number of



MOHAMMEDANS BOWING THEIR HEADS TO THE EARTH IN PRAYER

Photo: P. & A.

MOHAMMED ZAHIR SHAH, KING OF AFGHANISTAN (born 1914). He succeeded in 1933 on the assassination of his father, Nadir Shah, whose policy of neutrality he has upheld.

MOHMANDS. One of the warlike Mohammedan tribes occupying the Pathan hill-country which lies on the border between Afghanistan and the North-West Provinces of India in the neighbourhood of the Khyber Pass. An attempt was made in 1893 to define the frontier more exactly and to establish a British suzerainty over the country up to the borders of Afghanistan. The frontier tribes, including the Mohmands, resisted, and in 1897 and 1898 offered a serious challenge. Sir Bindon Blood, invading the Tirah valley, managed to restore order, but only after heavy losses had been suffered by the British forces. The region was afterwards settled by Lord Curzon, who separated the territory from the Punjab and erected a separate North-West Frontier Province, at the same time withdrawing British troops and entrusting the maintenance of order to the tribesmen.

Unrest among the Mohmands in September, 1935, was quelled in a short campaign in which native militia secured the passes overlooking the land held by disaffected tribes.

MO'HUN, CHARLES, FOURTH BARON (c. 1675-1712). A man of courage and ability, Mohun was dissolute and lawless. He was twice acquitted of murder by his peers, in 1693 for assisting in the murder of William Mountford, an actor, and in 1699 for his

share in a duel that ended fatally. He was killed in a duel in which he had already slain the Duke of Hamilton. It is thought that the Duke was about to set out on a secret mission, intended to cause Prince James Edward Stuart to be proclaimed as heir to Queen Anne; if this is true, Mohun's sword profoundly affected the history of England.

MOIRÉ, *mwah' rch*. Watered cloths are known under the general name of moiré fabrics. The watered pattern is produced on silk, rayon and cotton fabrics which usually have a ribbed structure. The moiré effect is obtained by subjecting the material, while damp, to heat and pressure. It is thus a process of embossing which utilizes the property of plasticity of the materials used. To obtain a good moiré design a two-roller or a three-roller embossing machine may be used, the latter giving superior impressions because of its greater rigidity.

Fabrics made from acetate rayon are particularly suitable for embossing, and there are numerous examples of very attractive "watered" rayons on the market. The process is by no means confined to plain woven fabrics, as the pile of plushes and velvets may be laid or broken in attractive designs. Plain cloths may be embossed with an all-over crêpe or granite design, and thus simulate the appearance of a more costly crêpe cloth.

MOLARS. See **TEETH**.

MOLASSES, *mo las' ez*. A thick, sticky syrup, yellowish or dark-brown, obtained as

a by-product in the manufacture of cane sugar. It is used in cookery and in the manufacture of confectionery, and when prepared for sale it is known in Britain both as syrup and as treacle.

The production of molasses is confined to the sugar-cane countries of the world, chief of which are Cuba, the West Indies, British India, Puerto Rico, the Philippines, and the United States.

MOLD. Urban District and administrative centre of Flintshire, Wales, in the valley of the Alyn, near the point where that river joins the Dee, with an area of 1160 acres, and a population in 1931 of 5133; served by the L.M.S.R., 193 miles from London. Iron, lead and steel works give employment to many, and there is extensive quarrying in the district. But agriculture is the main interest. The cattle fair attracts many visitors from a wide area of North Wales.

Features of historic interest include the Hallelujah Monument, which marks the traditional site of the battle in the eighth century between the Welsh forces under Bishop Germanus and the invading Saxon hordes. The residence known as "The Tower" is said to have been the palace of the Welsh chieftain, Rheinallt ap Gruffith.

MOLDAVIA. See RUMANIA.

MOLE. This animal never eats plant food, but lives entirely on insects such as grubs and caterpillars, and in doing so performs a



service to the horticulturist; yet because of the damage the mole does to plants in his burrowing, he is disliked.

The underground burrows are elaborate. The home of a mole consists of a central chamber with two connecting circular galleries, one above the other, together with several radiating passage-ways. One passage provides an exit in case of danger. The others lead to the feeding grounds. This burrow is dug in a mound of earth which can be distinguished from the ordinary molehill by its larger size.

Moles are thickset, five or six inches long, with narrow, slender muzzles, minute, fur-hidden eyes, no exterior ears, short, naked

tails, and short, powerful legs. Both pairs of legs are so attached to the body as to occupy the smallest possible space. The mole is an expert swimmer. Moles are always hungry, for they digest their food quickly, and if deprived of food for ten or twelve hours, they will die.

Mole fur is commercially valuable, for it is light in weight, warm, and very soft and thick.

Common moles are widely distributed in Europe and Asia and in North America.

Scientific Names. Moles belong to the family *Talpidae* in the order *Insectivora*. The common mole of Europe is *Talpa europaea*.

MOLECULAR WEIGHTS. See MOLECULE, below.

MOLECULE, mol' e kûl. The smallest particle into which matter may be divided and retain, theoretically, the properties and constitution of the original substance. For instance, one may take a spoonful of water from a bucketful, a drop from the spoonful, and so on. If the dividing process could be continued long enough, one would finally have a particle that could not be further divided and each part be water. Such a particle is a molecule of water. The molecule can be split by chemical process into *atoms*. In this case, two of the atoms would be hydrogen atoms, the other one an atom of oxygen. None of the atoms would be water.

Sometimes the atoms of a substance are all of one kind, in which case they unite to form an *element*. When, however, atoms of different kinds unite to form a molecule, the result is a *compound*. In the composition of matter, atoms unite chemically to form molecules, and molecules unite physically to form *mass*.

Molecular Force. Molecules are held together by a mutual attractive force called *cohesion*, which is not unlike that of gravitation (which see). As with the sun and planets, this force acts most strongly when the molecules are nearest together. In a *solid* the molecules are so close together that they can move very little, and the definite form of the body is not readily changed. In *fluids* the molecular force is less; the molecules change their relative positions easily, and the substance has no definite shape. In *gases* the force is so slight that the molecules tend to fly apart and expand as widely as possible.

Molecular Weights. Avogadro's Law states that equal volumes of gases contain the same number of molecules. Hence the relative weights of the molecules of two gases may be found by weighing the same volume of each. A given volume of hydrogen is lighter than a like volume of any other known substance. Oxygen is nearly 16 times as heavy. It is found convenient to call the

weight of the oxygen molecule 32. On this scale the weight of the hydrogen molecule is 2.016 and of the hydrogen atom 1.008. Atomic and molecular weights should not be confused. See ATOM; CHEMISTRY, etc.

MOLIÈRE, *mol' yair'* (1622-1673). The name by which the French dramatist JEAN BAPTISTE POQUELIN, is known in the literary world. Molière distinguished himself as a writer of social comedy, and in this sphere he is probably unsurpassed. The humorous element in his plays is obtained through the portrayal of character rather than through ludicrous situations. This is well seen in one of his most successful comedies, *Le Bourgeois Gentilhomme*.



MOLIÈRE

Photo - Brown Bros.

His first comedy, *The Blunderer*, was produced in 1653. He continued his work as a writer and actor until the last year of his life.

Among his greatest plays are *The School for Women*, *Tartuffe*, *Georges Dandin*, *The Misanthropist*, *The Doctor in Spite of Himself*, *The Imaginary Invalid*, and *The Miser*. Molière's attacks on hypocrisy in whatever sphere made him many enemies, but his skillful character-drawing, humour and sincerity earned him a popular fame which has endured to our own day.

MOLLUSCS, *mol' usks*. One of the major divisions, or *phyla*, into which the animal kingdom is divided (see ZOOLOGY). The term *Mollusca* is Latin for "soft-bodied."

All molluscs have soft, boneless bodies; most of them are provided with shells (see SHELL). In some molluscs, however, the shell is rudimentary or totally lacking. Scientists distinguish five major classes of Mollusca, of which three are well known. They are the *gasteropods*, including snails, slugs, and limpets; the *pelecypods* (*lamellibranchia*), e.g. clams, mussels, oysters, and scallops; and *cephalopods*, embracing squids, cuttle-fishes, the octopus (a shell-less form), and the nautilus group.

The shell is made by the animal itself from waste products of food and is composed of calcium carbonate. The bodies shut within the shells seem to have only a rudimentary structure, but they have, in reality, well-developed nervous, blood, and respiratory systems.

Molluscs having two shells, like the oyster,

are called *bivalve*; while snails, which have but one shell, are said to be *univalve*.



MOLLUSCS

(a) Scallop shell. (b) Tasmanian cuttlefish. (c) Fresh-water snail shell. (d) North American snail.

MOLOCH, *mō' lok*. A god of the Ammonites. As sacrifices to him, children were made to pass through fire (see II Kings, xxiii, 10).

MOLOKAI, *mo lo kah' e*. A Hawaiian island, the site of a United States government leper colony; scene of the labours of the saintly Belgian priest, Father Damien (d. 1889).

MOLTKE, *molt' kē*, HELMUTH CARL BERNHARD, COUNT VON (1800-1891). A Prussian military leader. In 1822 he entered the Prussian army as second-lieutenant, in 1835 attained the rank of captain, and in 1857 he was appointed chief of staff of the Prussian army which he commanded during the Seven Weeks War, fought between Prussia and Austria in 1866. The great triumph of his career was the overwhelming success of the German army during the Franco-German War of 1870-1871, for which he had prepared. He was made a field-marshal on his return to Berlin from France. Moltke was as great a soldier as strategist. He was the first to realize the military importance of railways.



VON MOLTKE



SOME OF THE MOLLUSCS

1. Nautilus Pompilius. 2. Helix Nemoralis. 3. Common Snail. 4. Black Slug. 5. Common Whelk. 6. Oyster, showing interior. 7. Black Olive (Oliva Maoria). 8. Horned Winkle. 9. Cowrie. 10. Cuttlefish. 11. Chiton. 12. Textile Cone.

MOLUCCAS, *mo luk' az*, OR **SPICE ISLANDS**. A group of islands in the Dutch East Indies, valuable for their pepper, clove, nutmeg, and other spice plants. Though discovered by the Portuguese in 1512, they were taken over by the Dutch within a few years. The Moluccas lie astride the equator in the East Indian or Malay Archipelago (see MALAY ARCHIPELAGO).



The Moluccas proper have an area of 30,168 square miles; with adjacent islands usually included, the total area is 43,864 square miles. The islands are of volcanic origin and are mountainous, but the soil is fertile and the climate favourable for agriculture. Besides spices, the chief products are fruits, coffee, cacao, tobacco, indigo and rice. The chief islands are Halmahera and Ternate, Serang and Buru, and the Banda, Timor Laut and Aru groups.

The inhabitants, numbering over 608,600, are of mixed descent, the native Papuan, Polynesian, and Malayan blood having crossed with that of other races. The chief city and centre of trade is Amboina, on the island of that name. The islands are administered from Batavia.

MOLYBDENUM, *mo lib' den um* (or *de' num*). A silver-white metallic element, whose symbol is *Mo*. It is second to iridium in hardness among the pure metals. It was first discovered in 1778. It is now used in large quantities in the manufacture of a hard steel alloy. The metal is also utilized for filaments in electric lamps, and for colouring rubber, cloth, and pottery. The source of commercial supply is molybdenite, a compound of molybdenum and sulphur. Australia, Norway, Canada, and the United States possess workable deposits.

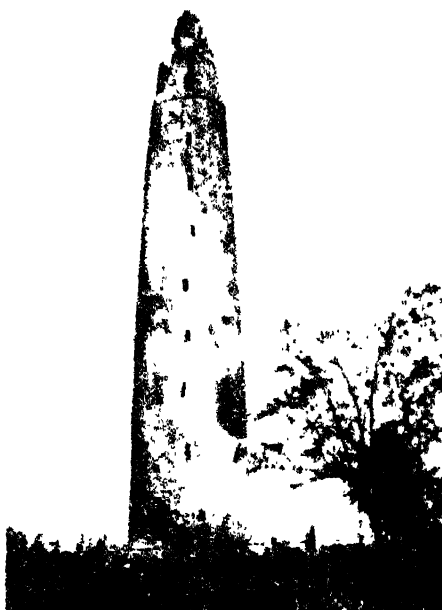
MOMBASA. A coralline island at the mouth of a deep arm of the sea on the coast of Kenya Colony. It is about 150 miles north of Zanzibar. In the eleventh century settlers from Mombasa in Oman arrived at the island and founded a town on the site of the present city; this gave the place its name. In the eighteenth century the Portuguese and the Muscat Arabs struggled for possession. In 1823 the rulers of the city placed it under British protection, but the protectorate was repudiated and the city fell under the power of the Sultan of Zanzibar, who in 1887 handed it to Britain for administration. The city eventually became the capital of the East Africa Protectorate, but in 1907 the seat of government was removed to Nairobi. Mombasa still forms a part of the Sultanate of Zanzibar, and is included in Kenya Protectorate as distinct from Kenya Colony. The present city is



MOMBASA, THE FORT

Though of considerable antiquity, this fort was again made use of during the World War.

Photo. Cherry Kearton



711-ION OF THE SEA AT MOMBASA
The precise age of the building is unknown
Photo: Cherry Kearton

linked to the mainland by a long bridge, and since 1921 has grown rapidly in importance. The harbour is probably the finest on the east coast of Africa, and is now the chief port for Kenya Colony. The population is 50,000, Europeans numbering 800. See KENYA.

MOMENTUM. In billiards, golf, and other ball games, the force with which a ball is struck depends upon two things—the mass (weight) of the bat or other object used for hitting, and the speed with which it is directed against the ball. The force exerted by the moving body on being stopped is proportional to its *momentum*, or *quantity of motion*. The measure of the momentum of any moving body is the product of its mass and its velocity. A body weighing 1000 pounds, moving at the rate of 8 ft. per second, has a momentum of 8×1000 units. A body moving but 1 ft. per second and weighing 8000 pounds has exactly the same momentum.

Momentum is sometimes confused with kinetic energy (see ENERGY). Energy can be converted into work, the product of force and distance; momentum is converted

into "action," the product of force and time.

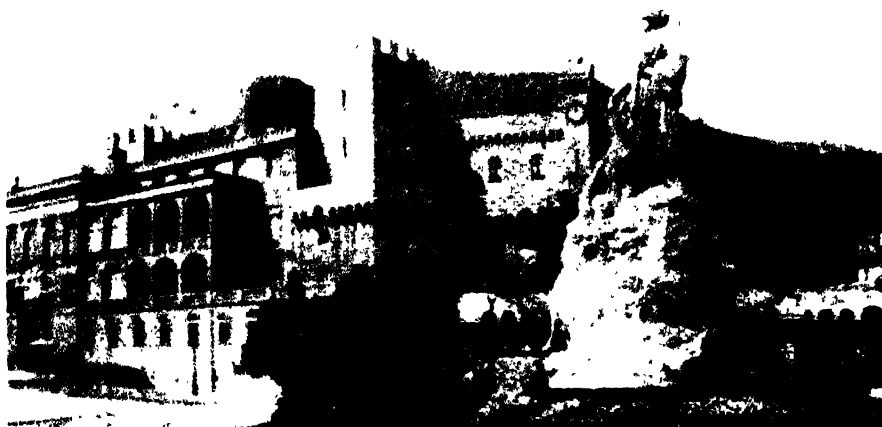
The measure of momentum is expressed in the abstract unit of 'foot-pound-second, which means the momentum of so many pounds of mass moving so many feet per second.

MOMMSEN, THEODOR (1817–1903). German historian, a native of Schleswig-Holstein; he became a great classical scholar and epigraphist and devoted himself assiduously to the collection and editing of inscriptions, visiting France and Italy for this purpose under the auspices of the Berlin Academy and the Archaeological Institute of Rome. On the *Corpus Inscriptionum Latinarum*, a monumental work of historical research which was the product of Mommsen's prodigious industry, his own *Roman History* is based, described in the Cambridge Modern History as "perhaps the most striking single volume in historical literature." In politics Mommsen was a Liberal, and he stood up for the independence of Schleswig-Holstein against the Prussia of Bismarck.

MONACO. The smallest independent State of Europe, with the exception of the Vatican City, Monaco is a principality on the Mediterranean coast of France, with an area of 370 acres. Most of its population of 22,294 (1933) may be found in three towns—Monaco (the capital), La Condamine (pop. 11,787), and Monte Carlo (pop. 9428). The management of the hotels and restaurants is the main occupation of the people. The Government was supported chiefly by revenues from the gaming tables of Monte Carlo until 1932, when the people of the principality were required to share directly



MOMBASA
Looking seaward from the ancient coastal defences.
Photo: Cherry Kearton



THE PROMONTORY
(C.2236, 8

MONACO
THE PRINCE'S PALACE

CASINO AT MONTE CARLO

in the expenses of the State. The Casino is the centre of interest in Monte Carlo. The small harbour can now, after improvement, accommodate fairly large vessels.

A fine road, the celebrated Corniche Drive, connects the Principality with the French cities of Nice and Mentone.

Monaco passed to the Genoese House of Grimaldi in 968, when the Emperor Otto I, founder of the Holy Roman Empire, ceded it to the ancestors of the present ruling family. It has been an independent Principality under French protection since 1861. The present Constitution was promulgated in 1911 by Prince Albert. A Ministry and Council of State assist the ruling prince, and there is a legislative body of twelve members, elected for four-year terms by universal suffrage. The Principality has its own flag.

Louis II became the ruling prince in 1922. He suspended some of the constitutional rights of the people when the political unrest of 1930 threatened his regime.

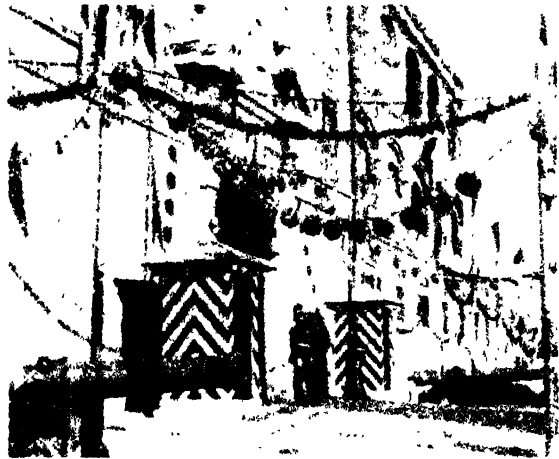
Prince Albert of Monaco, who died in 1922, was one of the great scientists of his generation. He devoted most of his life to oceanographical research in his yachts, and built the great Musée Océanographique at Monaco and the Institut Océanographique in Paris.

MONAD. A word now used principally with reference to a certain concept in the philosophy of Leibniz. He considered that the monad was the psychic unit of the world, as opposed to the atom, the material unit. Monads form a complete series, from the lowest, dormant, quite unself-conscious monad to the highly developed one with the power of "mirroring the rest of the world."

Every monad is distinct as an individual, unaffected, and unaffected by, any other monad. The fact that the human body, for instance, may comprise a great number of monads, apparently interdependent, is due to their having been so pre-arranged by God, himself the "monad of monads," who alone can influence other monads. They may be likened therefore to a number of perfectly synchronized clocks, all set going and all independent of each other.

MONAGHAN. County town and market town of County Monaghan in the province of Ulster, Ireland, with a population in 1926 of 4272. A medieval monastery was established here, but modern growth dates only from the opening of the Ulster Canal, on which the town is situated. See **ULSTER**.

MON'ARCHY. The real meaning of the word is the rule of one individual; a king, a tyrant—that is, one who has achieved the sole power—and a dictator are, in fact, all monarchs. The word, however, has gradually come to be restricted to the power of an hereditary ruler, or King. Anciently, the King was regarded as divine, or, at least, god-descended; this theory is still held in certain eastern countries. In Christian countries the monarchy has its sacramental aspect, for a King is the representative of God, and



MONACO

The palace decorated for the National Fete.

Photo Central

the essential ceremonies are the actual coronation, or assuming of the crown, and the sacring, or anointing with the holy oil. The term "Sacred Majesty" has thus a very real meaning, and a King, whose coronation solemnities have declared him responsible to God for the welfare of his people, holds an influence over their minds greater perhaps than his worldly power. Descended from generations of earlier Kings, he is the representative of national tradition; the ceremonies that "hedge him round," jeered at by some as idle extravagancies, have a high symbolical significance. He is the true centre of the nation, a fact more widely felt than appreciated. Many people nowadays regard a constitutional monarch as a mere figurehead, but in times of national crisis it is round Buckingham Palace that British crowds gather. A King indeed can be more truly representative of his people than a President or a Premier. He belongs to no class and, as many of our Sovereigns have proved, is equally at home when informally visiting a cottage or a mansion. A statesman risen to power must belong to some

faction, and his judgment, whatever his honesty, must be distorted by party prejudice. Our history has repeatedly shown that a Sovereign, aloof from party, can understand far better than his advisers what the ordinary man thinks and what he desires.

The English Monarchy. In the days of the small Saxon kingdoms, the kings were primarily war-lords and upholders of the traditional laws or customs. As the smaller kingdoms were conquered by larger, the powers of the victorious kings naturally increased, and with them grew the theory of "the king's peace." Crimes were still regarded merely as offences against individuals or families, to be expiated by payment or by feud, and only necessitated extra payments to the king if they broke his peace, which extended along the "king's highway" and for a definite radius round his person. Gradually the king's peace extended until it came to cover his whole realm, and the King of England

stood, more or less effectively according to his powers, between every subject and violence. The Viking invasions broke up the Saxon kingdoms, but slow communications forced the West Saxon conquerors to revive them as earldoms. The Conqueror brought England nearer to national unity by shattering the great earldoms. Monarchy in England thus attained a strength unknown in Scotland or on the Continent, and the people suffered less from the oppression of the harshest king than they did from the unchecked lawlessness of Stephen's reign. Feudalism was essentially monarchical; the King was the fountain of justice and the owner of the whole realm, from whom every landowner held, directly or at certain removes. Insurgent barons sought to defy or to control the King, but never to abolish kingship.

In 1272 Edward I, who had for some years been the real ruler of the country, was peaceably proclaimed in his absence as his father's undoubted heir. What had been the Saxon law of succession is difficult to determine. It has been said that the Witenagemot elected the kings, but it is probable

that this fancied right had been acclamation rather than free choice. Since the Conquest, the accession had followed no certain rule, depending sometimes less on right than on the ability to achieve coronation and control of the treasury. Since 1272 the law of primogeniture may be regarded as definitely established, although on occasions set aside by armed force. This was a real benefit to the country; the death of the Sovereign no longer involved palace intrigue and threats of civil war. In this reign also came the Model Parliament of 1295. Parliament then was the Magnum Concilium of the great

feudal tenants, called irregularly on occasions of importance, and the summoning of lesser gentry and townsmen was merely to facilitate taxation. The institution however, was to grow out of recognition.

Edward III weakened the monarchy, which he thought to strengthen, by marrying his sons to great heiresses, and these royal dukes



THRONES OF THE KING AND QUEEN IN THE HOUSE OF LORDS

Photo Visual Education Service

proved too strong for his successor, for Richard II tried and failed to break them. The resulting Lancastrian rule has been called a constitutional experiment, for Parliament declared Richard dethroned and took a larger share in control of the country. It was rather a time of monarchical decline. Henry IV, conscious of usurpation, was forced to pander to the powerful Archbishop Arundel and to a baronial clique who swayed the Lords and had their nominees in the Commons. Henry V used his undoubted ability to conquer France rather than the more dangerous domestic enemies of the Crown, and the troubled reign of his gentle son ended in a faction fight on a large scale. When this period of royal weakness ended, England was the scorn of the Continent.

The Yorkists began the revival of monarchy completed by the Tudors, with whom England re-emerged as a powerful nation, and whose success owed much to general disgust at the Wars of the Roses and much to personal character. This was the age of government by council, when nothing seemed too trivial to escape the attention of the

ministers of the Crown. These men, of whom Thomas Cromwell is the arch-type, lacked great connections and personal popularity; they thus depended entirely on the Crown, and self-interest reinforced their loyalty. Much valuable work was also done by the country magistrates, members of the lesser gentry that constituted the House of Commons. They began to interest themselves in State affairs, so that attendance at Westminster came to be a privilege, not a burden. The Tudors, not fearing their people, of whom they were in a real sense representative, made frequent use of Parliament. That institution thus grew rapidly in power, until Elizabeth herself saw fit to yield to it on some domestic matters, although she told the members that for high affairs of policy they were too light-brained.

Religious and Political Strife. Medieval Kings had lived on the wealth of royal manors, feudal dues and custom duties, with Parliamentary subsidies for extraordinary expenses. Now economic changes made the ordinary revenue insufficient and repeated Parliamentary grants became necessary. Henry VIII had made the mistake of granting the monastery lands to his agents and courtiers, who had developed into a powerful new nobility. Their possession of Church lands kept them militantly Protestant, and they suspected the Stuart kings of Catholicism. Their fierce individualism clashed with James I's doctrine of Divine Right—the immorality of resistance to the King, God's Vice-gerent. Royal poverty was their opportunity. They made revolutionary claims for Parliamentary power, thinking themselves conservative and quoting half-comprehended Lancastrian precedents. The Great Charter of 1215 was honestly mistranslated, until John's promises about the abuse of his feudal privileges were taken for renunciations of the right of taxation. Religious and political quarrels brought the execution of the King and a monarchy in the strictest sense—the sole rule of Oliver Cromwell. On his death, a predominantly Royalist people joyfully welcomed Charles II. He was enormously popular, but the religious and economic difficulties had not improved, so that he had a long war to wage against a Republican faction, whose leaders posed as the champions of liberty and Protestantism. His skill won him victory, the fruits of which were thrown away by the obstinacy and indecision of his Catholic brother.

The "Glorious Revolution" of 1688 gravely weakened the Monarchy, for Parliament gained control of the purse, and the new Sovereigns had no more hereditary right than the House of Lancaster. The

accession of a Hanoverian who could not speak English delivered England entirely over to the rule of one party. The Whig oligarchy was competent and, materially, England prospered; but, like all periods of absolute party rule, it was a time of spiritual stagnation. The Court ceased to be a refining influence, the Church lost zeal. The oligarchs and their mercantile allies exploited the poor, or treated them with a lofty benevolence that has inspired the phrase "as cold as charity." Their domination was checked, however, by the accession of George III, who broke the Whig political monopoly and won the love of the nation for the Anglican Royal House. He never revived the custom of presiding at council meetings, but, unlike his immediate predecessors, he made his will felt in domestic as well as foreign affairs.

The Nation's Rallying-Point. In 1837, respect for the Crown had been impaired by the eccentricities of the last two Kings. A contemporary describes how, when Victoria drove abroad, there was little enthusiasm and few hats were doffed. By the end of her reign she had earned the veneration of her whole Empire. Her son, Edward VII, won an even greater personal popularity. Yet in these reigns the Crown had exercised a lessening control, for Victoria in her youth had been trained by a Whig statesman to believe that the Sovereign may have influence but not power. George V, who was at first regarded as rather a nonentity, began his reign with the crisis over the Lords' absolute veto. During a troubled reign his moderation and courage won him to a remarkable degree the love and admiration of his people. In 1931 he exercised his prerogative in refusing to accept the resignation of Ramsay MacDonald, the Socialist Premier, and his action made possible a great national recovery. In the same year the Statute of Westminster declared him King of each individual Dominion, now released from all control of the British Parliament, so that the Sovereign is the sole link of the Empire. His Silver Jubilee, the year before his death, proved how high he had brought the prestige of the Crown. His successor, King Edward VIII, has won as Prince of Wales a wide affection and, unlike his recent predecessors, has been carefully trained for his great office. The King enjoys important prerogatives and the invention of wireless has enormously increased his potential influence.

MONASTICISM, *mon as' ti siz'm*. Withdrawal from the secular world, the *monastery* being the place of seclusion. The terms come from Greek *monastes*, "a solitary."

The cradle of monasticism was in the East, where, from very early times, men set them-

selves apart from the world for prayer and self-denial, sometimes as hermits living alone, and sometimes in communities. All the ethical religious systems of the East had their solitaries, of whom an example among the Jews were the Essenes, a pious and austere community of religious hermits, which was founded about 150 years before the time of Christ and is mentioned in the New Testament.

It is therefore not surprising that the rise of Christianity, which had its roots in Judaism, should have been accompanied by manifestation of the inherent trait in Nature, which leads some men to separate themselves from worldly occupations and interests for a closer approach to God.

Christian monasticism made its first appearance in Egypt, and by the beginning of the fourth century A.D. a considerable number of hermits, living as solitaries in huts out of earshot of one another, meeting only for divine worship and religious discussion, but being otherwise free to choose their individual mode of life, were scattered over a large part of the country.

In the year 305 Antony, the most famous of all hermits, organized these into a more regular kind of monastic life, and so may be considered the father of the Christian monastic system. At his death in 356 two types of the solitary life were to be found, colonies of hermits living in villages and loosely connected together by a rule, and monasteries in which a stricter and closer community life was lived. The latter type, destined eventually to prevail as the permanent form of monasticism, began with Saint Pachomius, the disciple of Saint Antony, and was later modified and improved by Saint Basil. In the meantime, some eccentric forms of hermit asceticism had manifested themselves, as in the strange mode of life of the "pillar saints" or Stylites, but these soon died out.

The rule of Saint Basil became almost universal all over the East, and has changed but little even to the present day; and the very large number of monasteries in the Orthodox Church of the twentieth century still follow it. It enjoins the three-fold vow of poverty, chastity and obedience—the universal obligation of all monks—combined with perseverance in worship, and a continued life of penance. Manual work of all kinds forms part of the eastern monastic system.

By the fifth century, monasticism had spread westward over a large part of Europe, and its disorganized state needed coherence and discipline. Saint Benedict of Nursia in Italy laid the firm foundations of this work, and western monasticism owes to him an incalculable debt. He established the famous Benedictine rule, simple, practical,

devotional and austere, which is the basis of monastic rules throughout the West in prayer, worship, discipline and work under the three-fold vow.

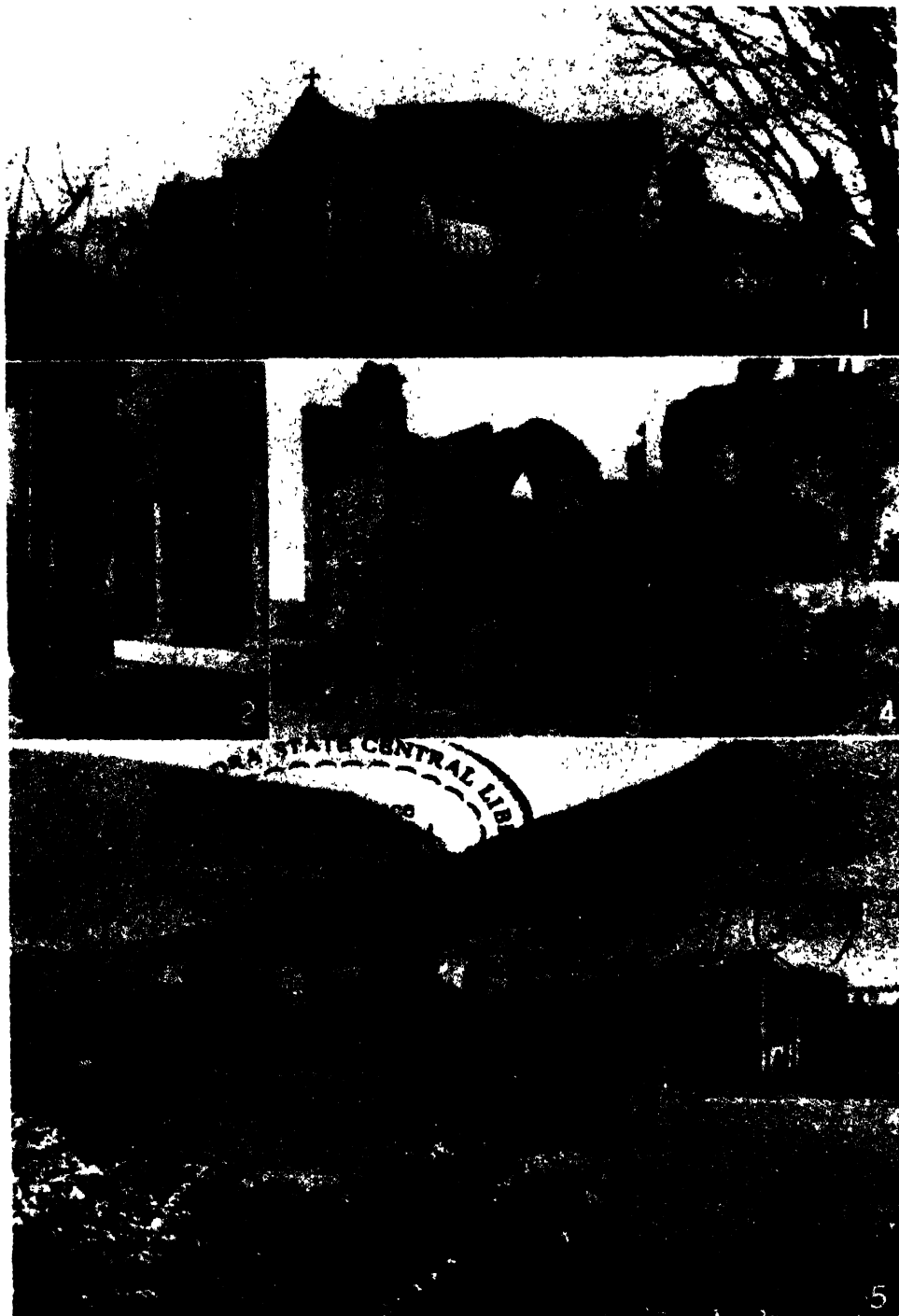
From his time the history of western monasticism widens out, two chief landmarks being the rise of the Cluniacs and of the Cistercians. Next there arose the great military Orders, the Templars, Hospitallers or Knights of St. John and others, and the great Orders of Friars, the Dominicans (the Black friars), the Franciscans (the Grey friars), and the Carmelites (White friars). All these six differ from the monks proper in having been founded for some special object or work.

Monasticism reached its zenith in the eleventh and twelfth centuries. Then a period of decline began owing to the increasing wealth, pride, worldliness and laxity of the great religious houses, which had largely lost their original ideals of being homes of piety, labour, learning and charity for the needy, and refuges for the oppressed. A revival came at the end of the fifteenth century, and though the Reformation in England and Northern Europe with its subversive effects in the sixteenth and seventeenth centuries, and the French Revolution in the eighteenth dealt tremendous shocks to monasticism and the religious houses, the life has revived to a very remarkable extent within the last 150 years.

Monasticism in England. This may be said to have begun with Saint Aidan, disciple of Saint Columba, who came from Ireland, already partially evangelized by Saint Patrick, and now sending out missionaries, to establish his famous monastery on the island of Iona in 563. From there Aidan went to Northumbria to be the first bishop, and founded the first English monastery at Lindisfarne. Out of this beginning and of the establishment by Saint Augustine at Canterbury of a monastery of the Benedictine type, the system spread over England during the next two hundred years. Great abbeyes arose at Wearmouth, Jarrow, Crowland, Peterborough and Ely, only to be ruthlessly ravaged and destroyed in the great invasion of the Northmen at the end of the ninth century.

The houses were rebuilt again, but the former spirit was lost, and by the time of the arrival of the Normans under William I the religious houses had become infected with spiritual decay. Then a time of revival came. William himself gave the example by the building of an Abbey at Senlac, the place of his victory, and it has been said that for a century and a half after the Conquest all the best men in the Church came from the monasteries.

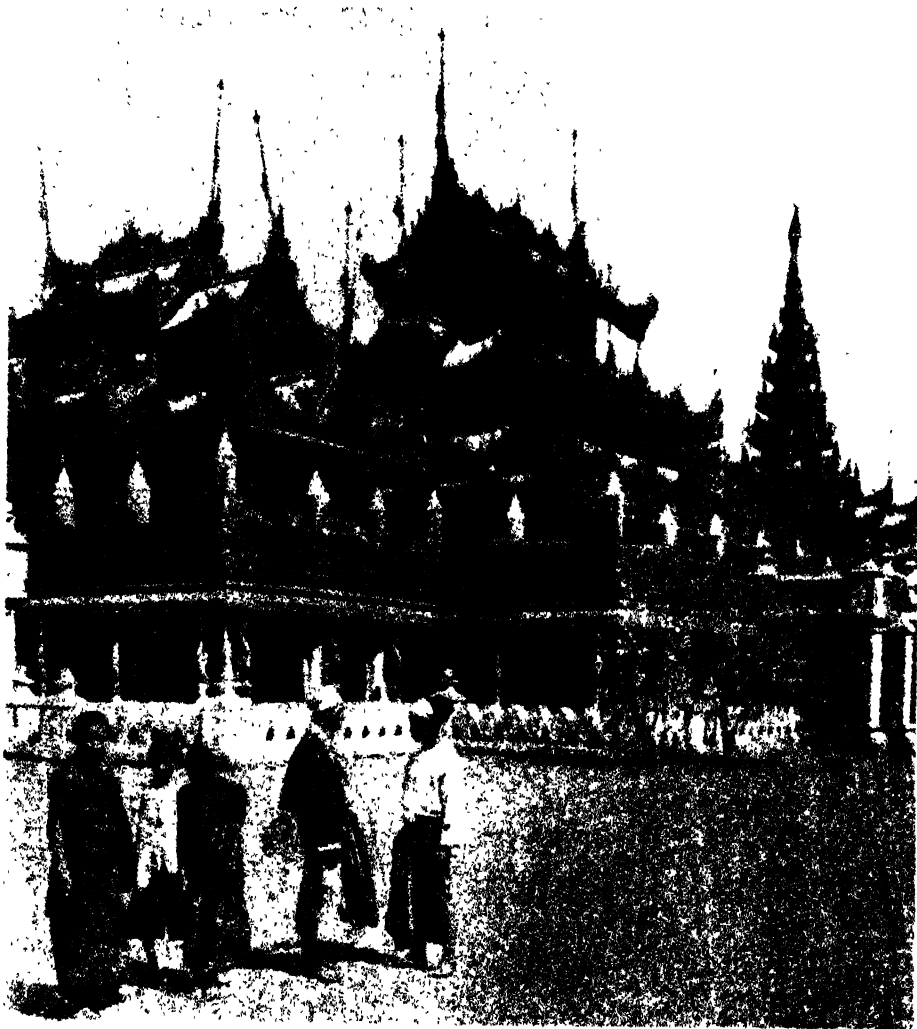
Such famous and beautiful religious houses



BRITISH MONASTERIES

1. Alton Abbey, Hampshire. 2. In the nave of Fountains Abbey, Yorkshire. 3. The guest chambers of Easby Abbey, Yorkshire. 4. Much Wenlock Priory, Shropshire. The washing basin in the front dates from the twelfth century. 5. Llanthony Abbey, Monmouthshire.

Photos: Taylor



THE GOLDEN MONASTERY, MANDALAY, BURMA

Photo: U. & U.

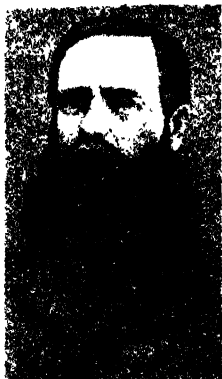
as Tintern, Fountains and Rievaulx of the Cistercians, Lewes of the Cluniacs, and the Charterhouses of the Carthusians mark the progress from this period. Then came again decline, due to the same causes of wealth and power with three consequents of pride, laxity and avarice; and by the time of Henry VIII, when the monasteries were dissolved, and their accumulated treasures seized by the Crown, there was much truth in the accusations made against the monks, though their misdoings were often exaggerated, to give a colour of excuse to the rapacity of the King.

From the time of the Reformation on-

ward the monastic life in England suffered eclipse until the nineteenth century, when the Roman Catholics re-established religious houses in the country. The Church of England, under the influence of the Catholic revival within it, called the Oxford Movement, has founded also a number of successful communities for women and a few for men.

The history of the conventual life of women in East and West has not been treated in this article. To speak generally, the fortunes of the religious houses of nuns have followed those of the monks, and have, at the relevant times in history, shared their advance or their decline.

MONCK, *mungh*, CHARLES STANLEY, FOURTH VISCOUNT (1819-1894). The first



VISCOUNT MONCK

Governor-General of the Dominion of Canada (1861); was born in County Tipperary, Ireland. Under him the federal constitution of 1867 came into force.

MONDAY. The name given to the second day of the week, derived from the Anglo-Saxon *monandaeg*, which means "moon's day," for in ancient times Monday was sacred to the goddess of the moon.

MONET, *mon'eh*, CLAUDE (1840-1926). A French painter, perhaps the chief artist of the Impressionist group. He was born in Paris. After a short period spent in the army, he studied art at the studio of Gleyre.

During the war of 1870, Monet lived in England, where he became acquainted with

Turner and Constable; returning to France, he began exhibiting the paintings which established his reputation. "Fontainebleau Forest," "The Orchard," "The Sun in a Fog," "Waterloo Bridge," "The Church of Vétheuil," "Rouen Cathedral," and "Views of the Thames," are some of his well-known works.

The painting of most historical interest among



CLAUDE MONET

Photo: U. & U.

the works of Monet is "Impressions," a sunset, from the title of which the Impressionists received their name. This painting was derided at the time of its exhibition. Monet is primarily a colourist, seeking to produce the impression of light by the blending of colour, often with remarkable success, as in his river scenes, whose merits are now recognized. See IMPRESSIONIST SCHOOL; PAINTING.

MONEY. A distinguishing mark separating human beings from the rest of animate nature is their co-operation with one another, whereby they increase one another's wealth. The exchange adds to the utility of the thing exchanged. Half the loaf and half the flask of wine are more desirable than only the whole loaf or the whole flask.

Once men get into the habit of exchanging their goods for a token, the exchange is facilitated. This *token*, this money that has as its normal purpose the smoothing of the way to mutual help, belongs to a developed civilization.

Evolution of Money. Whenever a thing is, for whatever purpose, eagerly accumulated, its use in exchange is inevitable. The thing universally desired for its own sake becomes a thing universally acceptable in exchange.

"By a tacit concurrence," writes Mill, "almost all nations at a very early period fixed upon certain metals, and especially gold and silver, to serve the purpose of medium of exchange. No other substances united the necessary qualities in so great a degree with so many subordinate advantages. Next to food and clothing, and in some climates even before clothing, a strong inclination in a rude state of society is felt for personal ornament and for the kind of distinction which is obtained by rarity in such ornaments. After the immediate necessities of life were satisfied, everyone was eager to accumulate as great a store as possible of things at once costly and ornamental. They were gold, silver, and gems. They were among the most imperishable of all substances. They were also portable. Gold and silver are eminently divisible and, when pure, always of the same quality, and their purity may be ascertained and certified by a public authority, hence they make more useful money than do gems."

Command over the Market. The money we have is prized because it enables one to command the market. It is a *token*, wanted not for its own sake, but for exchange. Payment of money closes a transaction only from the legal point of view. From the economic point of view, the transaction is not closed until the money is spent. Money itself is only a counter; and bank money, whereby a man's riches consist in a credit with his banker, is the highest form of the token. The money assures the receiver that, at his own option, he will be able to carry away from the market goods that will bear comparison with those he sold or with the service he rendered. He can turn his money income into his real income as he pleases.

Money as a Measure, in the Present and in the Future. But money is more than a pledge. It is a measure too; it affords a

means of comparison. Instinctively, men seek a measure of value that is not subject to arbitrary and inexplicable changes. We speak of "standard of value," and the very name implies something of endurance. The continuity that we have in other things—in the unit of length, for example—is equally desirable in the money unit. Similarly, the monetary unit that exerts greater command over the market to-day than it will to-morrow upsets the real meaning of the bargain between buyer and seller. If, when one bargained for money, the money was at once paid and at once spent, then changes in its power over the market would not matter. But, in most modern contracts, there is a time element. It is this time element that calls for continuity in the purchasing power of the monetary unit.

Money as a Store of Value. Besides, money may be used as a store of value. Whether a man has great or little incentive to save depends largely upon how great or little is his faith in the continuing value of the monetary units in which his savings are measured.

The Gold Standard. During the Middle Ages, gold began to circulate alongside the silver. Either metal could be used to cancel debts. But there was no fixed relation between an ounce of silver and an ounce of gold; and when a greatly developed trade made certainty a most desirable attribute of money, our rulers declined the heavy task of establishing such a relation. This was at the beginning of the nineteenth century. They decided, probably correctly, that it would be hopeless to expect any established relation between the metals to persist. Instead of fixing a ratio and of allowing free coinage to both metals, Parliament in 1816 avoided the difficulty by establishing *Gold Mono-metallism*. Gold alone was to have unrestricted power of releasing from debt. Silver was relegated to the subsidiary function of token money; the coins had a greater value as coins than as metal; and they had power to release from a debt of £2 or under.

Silver is the basis of currency in many parts of the Far East and has, after a lapse of many years, been given considerable importance in America by the policy of President Roosevelt to hold a proportion of silver to cover note issues.

The new representative of the pound sterling was the sovereign, containing 113.0016 grains of fine gold. This curious weight was apparently the market equivalent in gold of the twenty shillings that then circulated as a "pound" of silver. There was to be a pound's worth of gold in the sovereign. Very different in this matter from the shilling, the sovereign owed nothing of its value to the fact that it was a coin.

Hammer a shilling and destroy its impression, and you annihilate most of its value; hammer a sovereign till it is only a piece of yellow metal, and you destroy none of its value.

History of the Gold Standard. From 1914 to 1925 various impediments to the free use of gold made the gold standard only nominal. In theory the *Treasury Note*, which was issued as the token of a pound, could be exchanged for a gold sovereign at the Head Office of the Bank of England. But regulations under the Defence of the Realm Act prevented its export or its melting.

By the Gold Standard Act, 1925, Parliament again brought the pound into parity with a fixed weight of gold—in a modified form, however. The paper note (since 1928 a Bank of England note) was still to circulate as the hand-to-hand currency. The needless luxury of a gold coinage was foregone. But, provided that buyers were prepared to buy at least 400 ounces of fine gold in bars, the note conferred the right to get from the Bank of England the 113.0016 grains that used to enter into the sovereign. The "Gold Specie Standard" (where the gold circulated as coin) was replaced by the "Gold Bullion Standard." We ceased to use gold as a medium of exchange, to transfer value, we still used it as a measure of value. For we had the feeling, shared by most commercial communities, that only by assuring convertibility of the local currency into gold could we be certain that the measure of value would remain reasonably stable. It was this feeling that caused the business community to receive the announcement of the suspension of the Gold Standard Act with something like dismay. During the summer of 1931 the Bank of England experienced increasing difficulty in procuring gold to fulfil its statutory obligation of selling to all comers at a specified rate; a flight from the pound had developed, and people were turning their pounds into gold. The Bank felt itself constrained to ask for the suspension, and the Government acceded to the request.

The Sterling Group. The years since 1931 have seen the successful adoption of a managed currency in Britain, and over twenty other nations, representing over one-quarter of the world's trade, have based their currencies on sterling.

"Cheap" Pound and "Dear" Pound. "Cheap money" and "dear money" are ambiguous terms. In the general sense money is *cheap* when *prices rule high*, when the goods in the market have much power over money. In the money market sense, however, money is *cheap* when it is easy to borrow, *when interest rates rule low*. Strictly speaking, "money" is here "credit," just

as the "money market" is really the "credit market." Money may be, as in fact it was in 1935-36, "dear" in the first sense and "cheap" in the second.

MONEYLENDER. One whose business it is to lend money out of his own capital at interest. A moneylender is not allowed to describe his business as that of banking. No one may carry on the business of money-lending without having a licence, to obtain which a certificate is granted by a magistrate at the Court of Petty Sessions; the certificate is granted only to those of good character, and it may be suspended or cancelled at any time. On obtaining a certificate the applicant is then in a position to take out a licence (annual duty £15), which authorizes him to carry on the business of a moneylender in the name and at the address mentioned in it. Anyone carrying on money-lending transactions without a licence, or in a name or at an address other than his authorized name and address, is liable to a fine of £100, and loans made in such circumstances are not recoverable. A money-lending agreement must be evidenced by a written document, signed by the borrower before the money is paid over or any security for it given, and a copy of the document must be delivered to the borrower within seven days; otherwise the contract will be illegal and void. A moneylender is not permitted to charge compound interest or to stipulate that if default is made in any payment due under the agreement, the rate of interest shall be increased; nor is he allowed to make any charge for preliminary expenses. He is, however, allowed to charge simple interest on interest which is in arrear. Where the moneylending agreement is in any way "harsh and unconscionable," the borrower can apply to the Court to "re-open" the transaction and fix fair terms at its discretion. Where the rate of interest exceeds 48 per cent per annum, the court is bound by law to regard it as harsh and unconscionable, unless the moneylender can show good reason to the contrary, e.g. that the borrower's credit is so bad that the lender ought to be allowed an exceptional rate of interest in view of the risk he is running. A moneylender is bound at all times to supply his debtors, on payment of 1s. for expenses, with accurate information as to the state of their debts. It is unlawful for a moneylender to circularize the public or to employ canvassers, though he may advertise in the newspapers.

MONEY ORDERS. These are orders for money deposited at one post office in the United Kingdom and payable at another. A money order may be obtained on the applicant filling up the prescribed form and

paying the amount for which the order is required, together with a small commission. The requisition form must state as fully as possible the name, title or designation, as the case may be, of the payee and the paying office. If payable in the United Kingdom, an order may be crossed for payment through a bank. A money order is made out in duplicate by the post office clerk, one being handed to the applicant for transmission to the payee, and the other being sent by the issuing office to the paying office, with particulars of the remitter. Unless the order is paid through a bank, the person presenting it for payment must furnish the sender's name for comparison with these particulars.

MONEYWORT OR CREEPING JENNY.

A plant whose leaves are round, with only short stalks, and whose beautiful yellow flowers are solitary and axillary, that is, grow in the angle between the leaf and stem; it grows on the banks of rivers and in damp meadows, and is frequently cultivated in rock gardens. It is a perennial and flowers in June and July. The Cornish moneywort is a creeping greenhouse plant; it is to be found growing wild in Cornwall and other southern counties. The small flowers are pink and yellow, on axillary stalks.

Scientific Names. The moneywort is named *Lysimachia nummularia*. The Cornish moneywort is *Sibthorpia europaea*.

MONGOLIA. A great region in Eastern Asia, with loosely defined boundaries, part of which is now a republic. Roughly, Mongolia lies south of Siberia and north of Sinkiang and northern China. On the south the frontier follows the Great Wall of China in many places. On the east are the Great Khingan Mountains, and on the west the Altai Range. Estimates of the area range from 1,367,000 to 1,875,000 square miles, and those of population from 750,000 to 1,000,000. The greater part of the area is an elevated plateau, divided into a number of shallow basins with great stretches of level land. The heart of this vast region is occupied by the Gobi Desert. Winter is long and severe; summer is hot and short. Grassland and steppe predominate, with some trees on the mountain slopes. The native inhabitants, Mongols and Kalmucks, are a nomad pastoral people, with herds of camels, horses and sheep. The desert, however, needs only irrigation to render it very fertile. The chief town is Urga, or Ulan Bator Hoto (population 100,000), from which the caravan trade is carried on with China. The only railway is that from Peiping (Peking) and Kalgan, now extended beyond Kwei-hwating. Buddhist Lamaism is the prevalent form of religion.

Politically, Mongolia has been at the

mercy of Russia and China. On 13th November, 1912, taking advantage of the Chinese revolution, a Russo-Mongolian agreement was made, recognizing Mongolia's right to self-government and guaranteeing its immunity from Chinese military occupation or colonization. From 1912 to 1917, Russia remained the dominating influence in Mongolia, and by peaceful penetration was acquiring control over railways and finance. In 1915 Outer Mongolia threw off

signed by the Soviet Union and Outer Mongolia.

Inner Mongolia, which continued as a part of the Chinese Republic, is divided into three provinces, Chahar, Jehol and Suiyuan. The struggle between Japan and China for the possession of Manchuria also involved Jehol and Suiyuan. Jehol is now reckoned to be part of Manchuria. Frontier clashes between Japanese (Manchurian) and Inner Mongolian troops took place in 1936.

MONGOLIAN RACE, OR YELLOW RACE.

See RACES OF MEN.

MONGOLS, *mong' golz*. Pastoral, nomadic warlike tribes, from the plains of Central and Eastern Asia. Early in the thirteenth century, countless hordes, well led by their great chieftain, Genghis Khan, began a devastating march through Northern China, Turkistan and Persia. In the reign of Ogotai (died 1241), son and successor of Genghis Khan, the invaders pressed into Europe and devastated a large part of Russia, Poland and Hungary.

Kublai Khan (1216-1294), one of the most famous successors of Ogotai, set up his royal Court in China at Cambalu, the modern Peiping (Peking). When Kublai Khan died, his empire was separated into several weak kingdoms. These were reunited by the great Timur, or Tamerlane (1336-1405), who extended his dominions over nearly all Asia and ruled from his capital city, Samarkand.

The vast empire of Timur fell to pieces after his death, but a powerful Mongol state, known as the Kingdom of the Great Moguls, was established in India in 1526 by Baber, one of his descendants. Courts were maintained at Delhi and Agra. The Mogul kingdom in India lasted until the eighteenth century, when it was overthrown by British troops. See CHINA (History); GENGHIS KHAN, etc.

MONGOOSE, *mong' goos*, OR MUNGOOSE.

A small animal of the civet family, native to



MONGOLIAN FAMILY

The hut is built solely of thick felt.

Photo: OROG

its allegiance to China, and by the Treaty of Kyakhta was recognized as an autonomous republic.

After the rise of Bolshevism, Mongolia was overrun with Germans and Bolsheviks from the Baikal region. This time the Mongolians appealed to China; but owing to the brutality of the Chinese military commander, Hsi Shu-Tseng, the Mongolians revolted, and on 25th February, 1921, Outer Mongolia reasserted its independence, and a ruler called the *hutuktu* was crowned sovereign. Russia technically recognized the new government as independent, although Soviet troops remained there. On 31st December, 1922, when the Russian Union was formed at the tenth All-Russian Congress of Soviets, Mongolia became a part of it. Soviet Russia agreed with China to withdraw its troops from Mongolia. When this was accomplished, a republic was proclaimed, without a President, control being vested in a Parliament of 100 members. In 1932-1933, the unrest latent throughout Asia found expression in open warfare in Outer Mongolia. The Uryankhai valley in the north-west, south of the Sayansk Range, a well-watered and good pastoral land covering about 60,000 square miles, has long been an area of Russian influence, and was proclaimed a Russian protectorate in 1914. It is now the republic of Tannu-Tuva under Soviet protection.

In 1936 a treaty of mutual assistance was



MONGOOSE

Photo: Cherry Kearton

India. It is about 16 in. in length, and has long, stiff yellowish-grey hair. The mongoose has a fierce disposition, but is easily



DWARF MONGOOSE AND YOUNG
The lair is an ant-hill deserted by the ants after the death of their queen.

Photo: Cherry Kearton

tamed. It attacks and kills poisonous snakes, rats and other vermin. The mongoose is a species of ichneumon (which see).

Scientific Name. The mongoose belongs to the family *Viverridae*. It is classed as *Herpestes griseus*.

MONITOR. Name given to one of a genus of large lizards found in Africa, Southern Asia and Australia. The biggest specimens attain a length of 7 or 8 ft. But a species known as the *dragon of Komodo*, found on that and other West Indian islands, grows to be 12 ft. or more in length.

The best known monitor is the species found on the Nile. This lizard has a greenish-grey or brown back, and fine yellow lines and black stripes on the head and neck. It feeds on young crocodiles and on the eggs of crocodiles and turtles. See **LIZARD**.

Scientific Names. Monitors constitute the genus *Varanus* of the family *Varanidae*. The Nile monitor is *Varanus niloticus*. The dragon of Komodo is *V. komodoensis*.

MONITOR. Name given to a shallow draught warship, fitted with bulges to minimize damage by mine or torpedo, and armed with one or more heavy, long-range guns. Monitors can stand close into the coast in shallow waters, and are used for coastal bombardment and river

work; they possess long range, great hitting power, and a high degree of immunity from torpedo attack. The first ship of this type was the *Monitor*, constructed by the Federals to protect their wooden ships in the Charles River against the attacks of the "protected" Confederate cruiser *Merrimac*, a wooden ship covered with railway lines bolted together to give protection against gunfire. The *Monitor* had two 11-in. guns in a central revolving turret, mounted on a deck almost flush with the water; and modern types, which were used largely off the Belgian coast during the World War, embody the same principles.

MONK. Originally, a man who retired to live a solitary life for religious reasons. At the present time the term is applied to any member of a community of people who have retired from the world because of religious vows which they have taken. It is probable that the first order of Christian monks originated in Northern Egypt in the third or fourth century. The members lived as hermits, devoting themselves to the study of the Scriptures, penance, meditation and prayer. Later, monks began to gather themselves into communities, and to erect monasteries. Monks take vows of poverty, chastity and obedience. Members of the mendicant orders, such as the Dominicans and Franciscans, are termed friars rather than monks. See **MONASTICISM**.

MONK, OR MONCK, mungk, GEORGE, FIRST DUKE OF ALBEMARLE (1608-1670). An English soldier, well known for his share in the restoration of the Stuarts to the throne when the Protectorate had become ineffect-



NILE MONITOR
Photo: Cherry Kearton

ive. As a soldier he served in Spain, Holland, Ireland, Scotland and England. In the uprising against Charles I, Monk fought for the king, and at the Royalist defeat at Nantwich,

he was taken prisoner. After suffering imprisonment in the Tower for two years, he was released on consenting to aid the Parlia-



GEORGE MONK
First Duke of Albemarle.
(National Portrait Gallery)

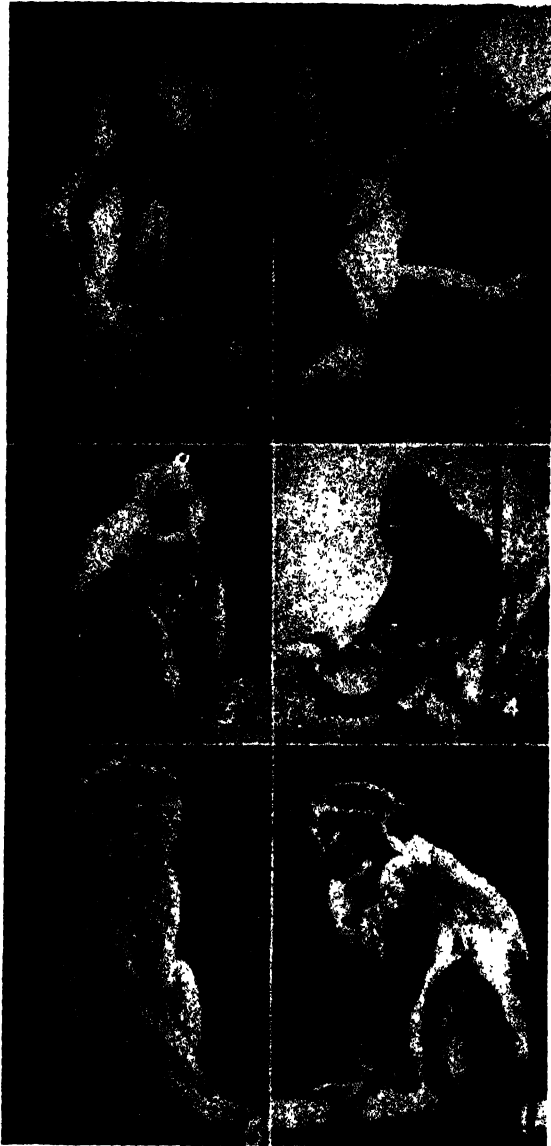
mentary cause, and was made lieutenant-general by Cromwell. After the death of Cromwell, Monk secretly waited for the right time to advance to London and restore the crown to

the Stuart king, Charles II. This he eventually did without shedding blood, by calling together the Presbyterian members who had been expelled from Parliament in 1648, thus securing a majority favourable to the Restoration. In recognition of this service, Charles II created him Duke of Albemarle, Privy Councillor, Chamberlain, and Lord Lieutenant of Devon and Middlesex.

MONKEY. The name is supposed to be derived from an Italian word meaning "old woman," referring to a fancied resemblance between a monkey's face and that of a wrinkled old lady. Though the name is applied in popular language to a wide variety of man-like mammals, strictly speaking, monkeys constitute the group with long tails and short, narrow faces. The larger, tailless members of the man-like animals are the *anthropoid apes*; to this division belong the gorillas, chimpanzees, orang-utans and gibbons. All monkeys have, in effect, four hands, for their toes are thumbs and fingers. Their arms are often longer than their legs. The usual food of monkeys is fruit and insects, but sometimes includes eggs, young birds and reptiles. Their tails are generally prehensile, i.e. with them they can grip the branches of trees, and so strong is the hold that they can swing from them.

They are as a rule easily tamed. Almost any monkey is quick to learn simple tricks. Some types are considered sacred.

Species. Many species which live in Brazil, Guiana, Venezuela, Central America and Mexico, are easily distinguished from those



TYPES OF MONKEYS

- (1) White Langur monkey from Malaya. (2) Silver gibbon.
- (3) Entellus, or "sacred" monkey. (4) Howler monkey from South America. (5) Patas monkey. (6) Green monkey.

Photos: Booth Line; U. & U.; R. & A.; Photopersa

of Africa and Asia by the greater breadth of their noses. They also have two more teeth in each jaw. The monkeys in the eastern



RED COLOBUS MONKEY

Photo: Cherry Kearton

hemisphere are more varied in colour than the American, some having touches of brilliant red, blue, and yellow, in addition to the usual green, grey or brown. Perhaps the strangest-looking of all monkeys is the *proboscis* or *trunk monkey* of Borneo, whose nose is a miniature of an elephant's trunk.



MONKSHOOD

MONKSHOOD OR **WOLF'S-BANE.** A common wild plant which is extremely poisonous. The leaves are deeply cut and hand shaped (palmate). The flowers, which are large, are purple and are easily distinguished, since the uppermost of the sepals, all of which are like petals in appearance, overhangs the cowl of a monk. These flowers, which appear in June and

July, are in terminal clusters on stems up to 3 ft. or 4 ft. high. The plant is the source of a powerful drug, *aconitine*.

Scientific Names. The flower is of the buttercup family, *Ranunculaceae*. The common monkshood is *Aconitum napellus*.

MONMOUTH, mun' muth. Borough, county town and market town of Monmouthshire, with an area of 5008 acres and a population (1931) of 4731; situated at the junction of the Rivers Wye and Monnow, 145 miles from London, and served by the G.W.R. It is the clearing-house of a wide and fertile agricultural area. During the summer months it is a centre for visitors to the Wye Valley.

A building of great historic interest is the Parish Church of St. Thomas, a chapel of Norman foundation with a chancel reconstructed in the Norman style, and retaining the original chancel arch. An ancient bridge of stone spans the Monnow, with a stone gateway, also of Norman workmanship. The castle, of which only scattered fragments remain, dates from the eleventh century, and was for some time the property of John of Monmouth, and later of John of Gaunt.

The town was the seat of an early British church in the seventh century. After the building of the Norman castle its prosperity increased apace, and the town was surrounded by wall and moat, and possessed four gates. In the reign of Henry III it was besieged by Simon de Montfort, and Henry V (Harry of Monmouth) was born there. In the Civil Wars of the seventeenth century, again the town was besieged at least twice, and was visited by Cromwell in person in 1646.

MONMOUTH, EARLS OF. Robert Cary, or Carey (c. 1560-1639), was the youngest son of Henry, Baron Hunsdon (1524-1596), who was one of the most trusted servants of his cousin, Queen Elizabeth; Hunsdon's mother had been Mary, elder sister to Anne Boleyn. Robert fought against the Spanish Armada and proved an efficient Warden on the Scottish border. On the death of Elizabeth, he took the news to James of Scotland, reaching Edinburgh in the evening of the third day from Richmond Palace. In 1604 he and his wife, Elizabeth Trevanion, were given charge of Charles, Duke of York, who, although in his fifth year, was unable to walk or to speak clearly. James wished the child to wear irons and to suffer an operation on his tongue, but Lady Cary insisted on the benefits of a quiet country life. She cared for him until he was over eleven. Charles I achieved a speech of noticeable beauty, although always slightly hesitant, and he became, like his tutor, a great walker and a fine horseman. In 1626 he created Cary Earl of Monmouth.

Henry, the second Earl (d. 1661), lived in scholarly retirement. His heir having been killed by the Roundheads at Marston Moor, the earldom was conferred in 1689 on Charles Mordaunt, later third Earl of Peterborough, grandson of Thomas, brother of Henry, a poet and devoted companion of Charles I. See PETERBOROUGH, EARLS OF.

MONMOUTH, HENRY OF. The by-name of Henry V of England, from the place of his birth.

MONMOUTH, JAMES SCOTT (OF CROFTS), DUKE OF (1649-1685) James Crofts, as he was at first called, was the acknowledged son of Charles II and the "brown, beautiful, bold but insipid" Lucy Walter, or Barlow, although he is said to have resembled Robert Sidney, another of the lady's lovers. James was born at Rotterdam. When he was



FIRST DUKE OF MONMOUTH
(National Portrait Gallery)

thirteen he was established at court, where his remarkable beauty and his liveliness made much impression. In 1663 he was created Duke of Monmouth and Orkney, and married to the Buccleuch heiress, Lady Anne Scott, whose surname he adopted. He served with courage against the Dutch by sea and by land. The Country

Party, led by Lord Shaftesbury, hated the Catholic heir, James of York, and suggested that Monmouth should be declared legitimate. Charles, devoted as he was to his son, refused to wrong his brother.

During the period of the "Popish Plot," Shaftesbury, for whom the popular and weak-natured Monmouth would have made an ideal puppet King, tried to oust York from the succession. Charles sent both brother and son abroad, but Monmouth, defiantly returning, was uproariously welcomed by the city. In 1680 Shaftesbury spread the legend of the Black Box, which contained proof of the King's marriage to Lucy Walter; the King's denial did not kill belief in the story, and Monmouth went on triumphant progress through the West. Throughout the struggle over the Exclusion Bill he was treated by Shaftesbury's followers with royal honours. When popular opinion turned in the King's favour, Monmouth was arrested but released on bail. In 1683 a Grand Jury found a true bill against him as a sharer in the Rye House

Plot, but Charles refused to believe that he knew of the attempt on his father's life. He was pardoned and his confession was published, but again he wavered and fled to Holland.

On the accession of James II, Monmouth landed with a few followers at Lyme Regis. His methods were characteristically hesitant, for, although he declared at first that he had come to save the Church, leaving his own claims to Parliamentary decision, he was before long proclaimed as King at Taunton. The gentry held aloof; the common folk, who loved him, came to his standard. Many of these, however, he was compelled to send away owing to the difficulty of providing them with weapons. "King Monmouth's" army marched and counter-marched aimlessly, and the news came that Argyll's complementary Scottish rising had already failed. A night attack—a manoeuvre hardly possible for untrained troops—was made at Sedgemoor on the royalists, commanded by Lord Feversham and John Churchill. A rhine, or deep ditch, held up his forces, and in the early morning the regular infantry made target practice of the resolute peasants until the cavalry had worked round the rhine. The harrying of Colonel Kirk's "Lambs" was succeeded by the "Bloody Assize" of Judge Jeffreys. Monmouth was caught and made a grovelling appeal for mercy to James, who unwisely sent him to his death, thus clearing the way for a more dangerous Protestant pretender, William of Orange. Monmouth died with courage.

From Monmouth is descended the present ducal house of Buccleuch, the Montagu-Douglas-Scott family, of which the Duchess of Gloucester is a member.

MONMOUTHSHIRE. A south-westerly county of England (for political purposes considered within the Principality of Wales), with an area of 349,569 acres and a population (1931) of 434,958.

Physical Features. In structure the land is irregular, but is nowhere entirely level, and rises both in the east and in the west to considerable ranges of hills. In the north-west, spurs of the Black Mountains extend into the shire, but the highest summit within the county is Sugar Loaf Hill, 1955 ft. to the north of Abergavenny. Scenically the chief feature of this area is the Vale of Ewias, in which are the ruins of Llanthony Abbey. From the plateau which rises south of the Usk, including Mynydd Llangynidr, parallel lines of hills extend generally southward, and cover most of the county to the west of the Usk. Here is Coity Mountain (1905 ft.). There is some attractive scenery, but the mountain-sides are scarred by coal



MONMOUTHSHIRE

1. Near Abergavenny: looking across the Usk Valley towards the Sugar Loaf. 2. Lamb Row, Blaina: typical dwellings of the coal-mining district. 3. Raglan Castle. 4. On the River Wye: Tidenham Cliffs (Gloucestershire) are on the left.

Photos: Taylor; Fox

workings and the valleys disfigured by mining villages.

The central part of the county is occupied by the fertile Vale of the Usk, the chief agricultural area of the county. To the east another range of hills extends southward from Craig Serrerrthain (1389 ft.), roughly parallel with the Wye, and reaches the Severn estuary at the Black Rock. The whole coast-line, with the exception of the extreme east, is level, and was until recently unreclaimed marsh-land.

The principal river is the Usk, which rises in the Carmarthenshire Black Mountains, enters the county near Llanwenarth and flows in a mainly southerly direction through Abergavenny, Usk, Caerleon, and Newport. The Ebbw, rising in the extreme north-west, flows first south, then south-east into the Usk estuary. The Rhymney forms the greater part of the western boundary of the county; while in the east, the Wye forms the boundary from Monmouth to the Severn. A tributary of this, the Monnow, forms the north-western boundary from Pandly to near Monmouth.

Climate. Considerable variations of both rainfall and temperature occur, due chiefly to the large variations in altitude. The mean annual temperature is approximately 50°, and the mean annual rainfall varies between 35 in. near the coast-line to 50 in. or more in the highland plateau.

History. The history of Monmouthshire from the earliest times forms a part of the history of Wales rather than of England. Welsh influence is still strong, since the hilly character of the county hindered a complete settlement.

At the time of the first Roman invasion, Monmouthshire, together with the present Glamorganshire, formed the territory of the British tribe of the Silures. At this time

Caerleon was one of the principal British strongholds. The Roman Conquest did not come until the end of the first century A.D., under Scapula and Agricola. Caractacus was the mainstay of the opposition, and, according to tradition, after his final surrender, was restored to the position of titular chieftain over Monmouthshire and much of South Wales at the instance of Claudius. Important Roman stations were

founded at Caerleon (Isca) and Caerwent (Venta Silurum).

In the centuries after the Roman withdrawal, Welsh independence became a rallying cry, and it would seem that the Saxons never firmly established their authority, for the Wye Valley became the limit of Saxon expansion, though with Caerleon is associated the tradition of King Arthur. In the tenth century Danish marauders, sailing up the Severn estuary, harried the coastal districts, and possibly penetrated up the Wye as

far as Monmouth. At the beginning of the eleventh century the whole district was overrun by King Canute, and again by Harold in 1063 and 1064.

From the Norman Conquest onward there was a succession of revolts, characterized by guerilla tactics emanating from the central mountainous districts of South Wales. In all these Monmouthshire took part. It was Fitzhamon, Earl of Gloucester, who finally established Norman supremacy within the county. During the reign of King John there was a rebellion under Llewelyn the Great. Again in the rebellion of 1263 Monmouthshire made a bid for liberty under Llewelyn the Younger. Owen Glendower suffered a severe reverse at Usk in 1405. The great event of the early modern era was the abolition of Lords Marchers, and the incorporation of Monmouthshire as part of England in 1553. In the Great Rebellion



most Monmouth men declared for Parliament; but Chepstow, Monmouth and Raglan were Royalist garrisons, and the latter was not captured until 1646.

At the present time, Monmouthshire is divided into five Parliamentary Divisions: the Abertillery, Bedwellty, Ebbw Vale, Monmouth and Pontypool Divisions, each returning one Member to Parliament; in addition, the County Borough of Newport returns one Member.

Communications. The county is served by the G.W.R. and L.M.S.R. A main line from London serves Newport and Chepstow, thence proceeding to Cardiff and South Wales. Another line from Gloucester and Bristol joins this at the Severn Tunnel Junction, and there are branches from Newport and Pontypool to the mining districts and agricultural towns. The main roads, though hilly, are generally good. Journeys from east to west frequently involve long detours owing to the mountain barriers.

Agriculture and Industries. Monmouthshire is an industrial rather than an agricultural county. Less than 75 per cent of the total area is under farm, and of this the greater part is permanent pasture. In the central Vale of the Usk small quantities of wheat, oats, and hay are produced. Sheep are reared in large numbers on the mountain slopes, the western breed having a great reputation for hardness. Dairy-farming is becoming the most important pursuit.

The most important industry is concerned with the coal and iron trade, and Newport (which see) is one of the chief coal-shipping ports in Britain; while the Ebbw Vale, Pontypool and Glenavon districts contain some of the most extensive ironworks in the country. Owing to the presence of coal, a great variety of subsidiary industries have sprung up.

Antiquities. Prehistoric hill forts are common, and include the famous Caer Fawr near Newchurch, which probably dates from a Neolithic age, with subsequent re-fortifications. Here, also, stands a large cromlech, and there is another example of these monuments at Bassaleg. The most important Roman antiquities are at Caerleon and at Caerwent. Many interesting discoveries from Caerleon are preserved in the museum, including some paving stones which formed part of Roman villas. The Roman amphitheatre, associated by tradition with King Arthur, has been restored, and parts of the original wall are still extant. At Caerwent the remains are more considerable and include large portions of the walls, two Roman gates and part of the amphitheatre as well as the foundations of a temple and what is generally supposed to have been a bathing-

place. Of Norman castles, none is in a perfect state of preservation; but at Usk, Newport, Abergavenny and Chepstow there are interesting remains. Chepstow and Raglan Castles, though better preserved, both have many later additions. Of ecclesiastical buildings, the ruined abbeys of Llanthony and Tintern are supreme; these were both founded in the early part of the twelfth century by monks of the Cistercian order.

Chief Towns. The county town is Monmouth (which see). Chepstow, Newport, Abergavenny and Abertillery are also described in separate articles.

The principal centres of the coal-mining industry and the iron and steel trades are: Abercarn (area, 9505 acres; population in 1931, 20,551); Abersychan (area, 10,121 acres; population in 1931, 25,748); Bedwellty (area, 7274 acres; population in 1931, 30,074); Ebbw Vale (area, 6869 acres; population in 1931, 31,686); and Tredegar (area, 8148 acres; population in 1931, 23,192).

MONOCLINIC, *mon o klin' ik*, **SYSTEM**. See MINERALOGY (Crystals).

MONOCOTYLEDON, *mon o kot il e' dōn*. See COTYLEDON; BOTANY.

MON' OGRAM. A figure formed of several interwoven letters and used as an abbreviation of a name. Two well-known examples are the sacred monograms used in Christian art. The first is the monogram formed of the first two letters (XP) of the Greek word for Christ. This was superseded later by the familiar IHS, an abbreviation of ΙΗΣΟΥΣ.

MONOMANIA. In psychology, a term applied to a mental state in which the mind of the patient is deranged on a single subject, or on one idea, such as a fixed belief that he is being persecuted. The physical condition of the patient is generally normal. Monomania is often only an ailment of nervous origin, and is not the mania which accompanies disease of the brain cells. See INSANITY.

MONOMETALLISM, *mon o met' al iz'm*. A monetary system which uses only one metal, usually gold, as a standard of value in coinage. It is opposed to bimetalism, which uses two metals, on the theory that one stabilizes the other. Monometallism is often referred to as the "single standard." See BIMETALLISM.

MONOPLANE. See AEROPLANE.

MONOP'OLY. In law, a special kind of privilege conferred on a subject by the King, viz. the sole and exclusive right of making, working or selling some valuable commodity. In popular speech, the word is also used to describe the advantage enjoyed by a firm which, as a matter not of right but of fact, possesses an exclusive market in a particular

product. At common law, the King had an unlimited power to grant monopolies. The frequent abuse of this power by the Tudor monarchs led finally to the Act of Parliament known as the Statute of Monopolies (passed in 1623), which declared all grants of monopolies to be null and void. The Statute, however, made one very important exception in favour of grants by Letters Patent of "the sole working and making of any manner of new manufactures within this realm to the true and first inventor and inventors of such manufactures" for the period of fourteen years. This is the valuable right now known as a *patent*. The period has been extended to sixteen years. There has been no special legislation in England directed against monopolies in the secondary sense noted above (see, however, RESTRAINT OF TRADE); but in the U.S.A. the Sherman Act restrains the formation of "trusts," an American expression for large commercial combines which, by being in a position to control a whole market, would, in fact, enjoy a monopoly. Municipal authorities and certain statutory bodies have been granted monopolies for the supply of commodities like water, electricity and gas, and in public transport. See PATENT.

MONO-RAIL SYSTEM. As its name implies, the outstanding feature of a mono-rail system is the single rail for the support of the carriages. The principle was successfully applied in Algeria as early as 1882, but the best known and most practical mono-rail system is the one constructed in 1901 by a German engineer, E. Langen, and connecting the cities of Elberfeld and Barmen, near Cologne. The single rail is suspended from curved arches by means of trusses. There are two pairs of flanged wheels, placed tandem, for each carriage. These wheels run on the suspended rail and the carriage is suspended from the wheel supports.

MONOTHEISM, *mon' o the iz'm.* Belief in and worship of one god. (See POLYTHEISM.)

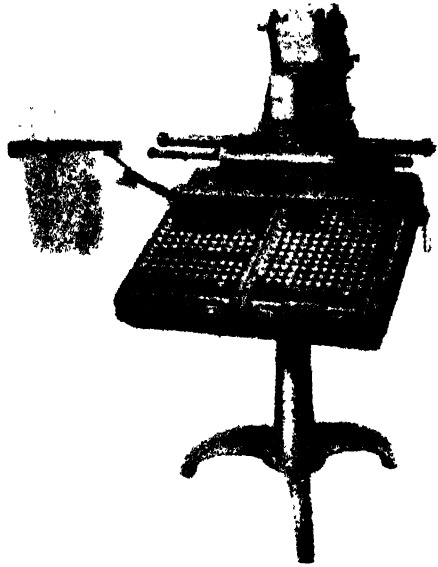
MONOTREMATA. One of the lowest orders of mammals. The order includes the duck-bill and spiny ant-eater. The former is found in the rivers of Australia and Tasmania, the latter in Australia, Tasmania and New Guinea.

MONOTYPE. There are two chief kinds of typesetting and typesetting devices. One of these casts and sets type *one* letter at a time, as a compositor would take them from his case and arrange them into words. It is appropriately called the *monotype*. The other machine, called the *linotype*, casts and sets type in a solid bar of metal the length of a *line* of print. See LINOTYPE.

The monotype is used in setting the type

for books, and in any kind of publishing where a more leisurely process is possible than that followed in the great newspaper offices.

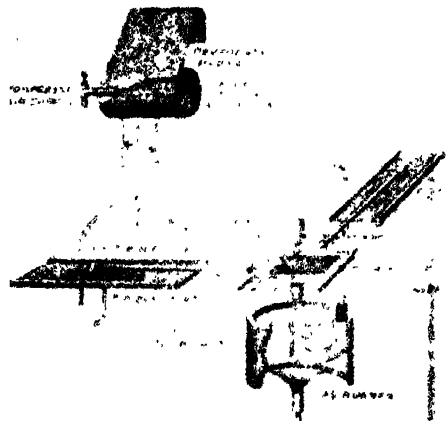
One part of the monotype is a machine looking somewhat like an ordinary type-



MONOTYPE KEYBOARD

The characters required are registered on the strip of paper seen at the top

Photo Monotype Corporation



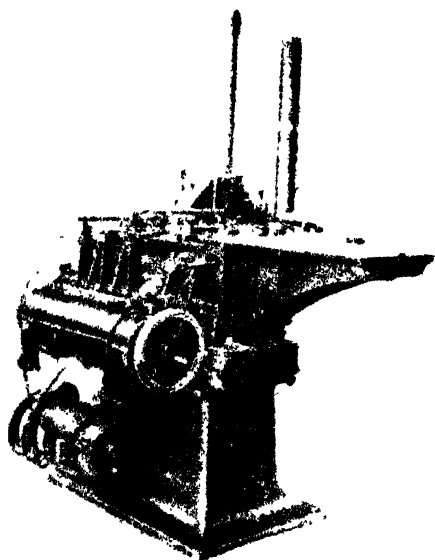
OPERATION OF THE KEYBOARD

writer, but having a much larger keyboard, containing all the characters used in printing in English—276 in all. By pressing the keys, the operator releases tiny metal punches, which make perforations in a paper ribbon.

At the end of each word a spacing key is struck, and when the line is nearly filled out, a bell warns the operator that he will have to begin a new line.

The ribbon, with its many tiny holes, is fed into the casting machine backwards.

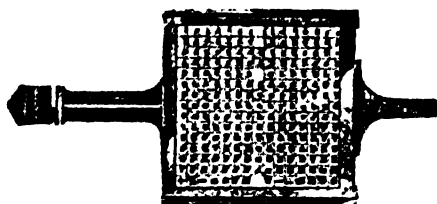
a jet of compressed air operates a mechanism which picks up the proper matrix—the mould from which letters are cast—and carries it to the casting box, where it forms the letter in melted type metal. The newly-made letter is carried to a galley; letters



MONOTYPE CASTER

New type is made for each piece of work.

Photo: Monotype Corporation



MATRIX

Photo: Monotype Corporation

become words, words extend into lines, and when a line is finished the machine spaces it. See PRINTING.

MONROE, JAMES (1758-1831) Fifth President of the United States, born in Virginia of Scottish and Welsh parentage. He served under Washington in the American War of Independence and then took up the study of law under Thomas Jefferson, Governor of Virginia. At the age of 24 he became a member of the Virginia Legislative Assembly, and at 32 was elected to the Senate of U.S.A. In 1794 Washington sent him as minister plenipotentiary to Paris, but recalled him two years later.

In 1799 Monroe became Governor of Virginia, and in 1803 was sent by President Jefferson on a second mission to France and negotiated for the purchase of Louisiana. This accomplished, he was Ambassador in London and for a short time in Spain. Returning to U.S.A. in 1808, he became Foreign Secretary and afterwards War Secretary under President Madison. In these offices he was responsible for the conduct of affairs during the Second American War against Great Britain (1812-13).

Monroe succeeded Madison as President of U.S.A. in 1817, and enjoyed the support of the two principal parties, Democrats and Federals. In 1820 he was re-elected with

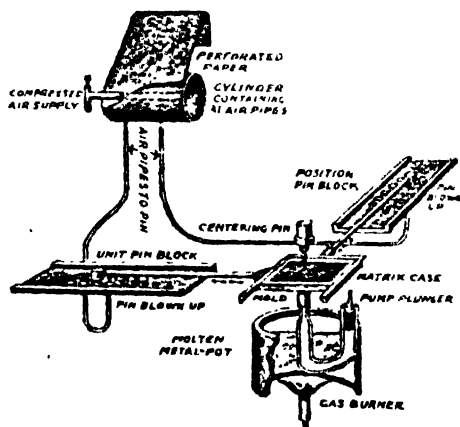
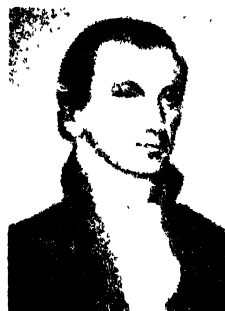


DIAGRAM SHOWING OPERATION OF MONOTYPE CASTER

It passes over a board having on its surface many small perforations exactly corresponding to all that may be punched in the ribbon. When any perforation, or series of perforations, passes over similar holes in the board,



PRESIDENT MONROE

only one dissentient vote, which was cast, as it was said, in order to preserve for Washington the unique distinction of a unanimous election to the Presidency. On 2nd December, 1823, Monroe enunciated a famous principle of American foreign policy, known as the Monroe Doctrine (see below). After the expiration of his term he retired into semi-private life, and died in New York in 1831.

MONROE DOCTRINE. The revolt of the Spanish Colonies in South America (1819-20) had brought up as an acute issue the question of the relations between the Old and the New World. In the farewell speech of Washington, the complementary principles of American non-interference in Europe and of European non-interference in America had already been foreshadowed. But it was feared that the powers of the Holy Alliance might intervene to bring back the Latin colonies to their allegiance, which prompted Monroe to define in formal terms the attitude of the United States Government toward military or naval intervention by European powers in the affairs of the American continent. "We should consider," he said, "any attempt on their part to extend their system to any portion of this hemisphere as dangerous to our peace and safety." And again, "The American continents . . . are henceforth not to be considered as subjects for future colonization by any European powers."

The Monroe Doctrine, being a unilateral declaration, is not a part of international law, and there is no formal compact between U.S.A. and the other republics of America relating to mutual support. Yet it has become a corner-stone of U.S.A. policy, and all foreign treaties entered into by American states are interpreted in the light of this doctrine. It is to be regarded as an expression of the will of the people of U.S.A., and therefore capable of modification in face of concrete facts. The Monroe Doctrine has been invoked on many occasions in international disputes, notably in relation to projects for the construction of canals in Central America, the attempt to set up a Mexican Empire with French help in 1865, and the Venezuelan boundary dispute in 1895. See CANNING, GEORGE.

MONROVIA. The capital and principal city of Liberia. Its estimated population of 10,000 includes negroes, Americans, Europeans, and a mixed race of Americans and Liberians. See LIBERIA.

MONSIEUR, *me syur*. A French title originally applied to persons of considerable rank, though not to those highest in rank. To-day it is applied to any Frenchman of good breeding, with much the same meaning

as English-speaking people give to the term *Mr.* In the Middle Ages, *Monsieur* was a title applied to saints and as a prefix to the names of the royal family, and to that of the Pope. From the reign of Louis XIV it was used especially of the eldest brother of the King (whose eldest son the dauphin was "monseigneur").

MONSOONS'. Seasonal winds blowing in alternate seasons from sea and from land. They occur in low latitudes where large land masses adjoin great oceans, but not in equatorial regions where the differences in insulation throughout the year are not sufficient to cause the wide differences in temperature, and so in pressure, on which the monsoons depend. Landward-blowing monsoons occur during the hottest season and are charged with moisture; seaward-blowing monsoons occur in the cool season and are dry. Though monsoon winds occur in North Australia, West Africa and to some extent in the southern United States, the term is frequently restricted to the monsoons of southern and eastern Asia, areas which are called the monsoon lands. The entire prosperity of India, Burma, Siam, Indo-China, China and Japan may be said to be dependent on a regular and strong south-west and south monsoon to bring rain during the warm season. The outward monsoon, north-westerly, northerly or north-eastern in different parts, generally brings dry, cool or cold weather, but in certain local conditions may bring some rain.

MONTAGU OR MONTACUTE. See SALISBURY, EARLS OF; SANDWICH, EARLS OF; MANCHESTER, EARL OF.

MONTAGU, LADY MARY WORTLEY (1689-1762). An authoress, daughter of Evelyn Pierrepont, a member of an ancient and distinguished family. In 1712 she secretly married Edward Wortley Montagu, a Whig Member of Parliament. After the accession of George I in 1714, she began a literary career. The six "Eclogues" are her best-known poetical works, but her fame to-day rests almost entirely upon her witty letters.

MONTAIGNE, *mon layn*', MICHEL EVQUEM DE (1533-1592). A French



MONTAIGNE
Photo. Brown Bros.

writer, who has won fame as the initiator of the essay. He was born at the Castle of Montaigne in Périgord. He became a pupil at the Collège de Guyenne at Bordeaux, and when thirteen began the study of law. In 1554 he was made mayor of Bordeaux, and from 1557 to 1570 was councillor of the Bordeaux Parlement. His first literary work was the translation of the *Natural Theology* of Raimond Sebond.

His essays were inspired by the caprice of the moment and touched upon all kinds of subjects, including the tastes, habits and thoughts of his own daily life. His *Voyages*, a diary of his travels, were first published in 1774. See ESSAY.

MONTANA, *mon tah' na* The largest of the north-western states of the American Union. It has an area of 146,997 sq. miles, and a population (1930) of 537,606.

Physical Features. The eastern three-fifths of the state consists almost entirely of rolling prairie, which rises gradually to meet the foothills of the Rocky Mountains to the west. The main range of the Rocky Mountains extends from the Yellowstone Park across the state in a north-westerly direction. About 100 miles west of the main range is found the Bitter Root Range, which forms over half of the western boundary of the state. Between these two mountain ranges lies a broad basin, broken into narrow valleys by numerous spurs and cross ranges.

Granite Peak, 12,850 ft., is the highest mountain.

The western section of the state is drained by the Kootenay River, and by Clark's Fork and its tributaries. The east is drained by the Missouri-Yellowstone system. The mean temperature is about 11° F. for the

coldest month, and 70° F. for the warmest. The rainfall averages about 15 in. in the eastern regions to about 20 in. in the west, while the north-western corner has a still greater rainfall.

A huge dam is being constructed across the Missouri near Glasgow, for power and irrigation purposes.

Agriculture and Industries. The prairies, the extensive alluvial bottom lands, and the numerous valleys are fertile, though even yet there are millions of acres uncultivated. In spite of Montana's great mineral wealth and the not fully developed agricultural possibilities, agriculture is the state's greatest source of wealth, and is much assisted by irrigation.

Wheat is the largest single crop; maize, oats, flax seed, potatoes, hay, and sugar-beets are other crops of importance. The western section of the state is well suited to general farming, dairying, and fruit-growing. Sheep-farming is an important industry also.

Throughout Montana great expanses of semi-arid land are used for grazing purposes. There are about 4,000,000 sheep in the state, and cattle-ranching is largely carried on.

There are over 500,000 acres of state forest, and the seventeen national forests within the state occupy over 15,000,000 acres.

Montana is one of the richest states in mineral ores. Following the first period of gold-mining, came the discovery of a rich vein of silver in 1865.

Silver is now obtained chiefly as a by-product of the smelting and refining of copper. Zinc and manganese are also produced in large quantities. Coal is being mined to a greater extent every year, and the mining of sapphires has increased.



'BAD LANDS' OF MONTANA

Manufactures. The smelting and refining of copper is by far the most important manufacturing industry, and great smelter mills are located at Anaconda, Great Falls, Butte, and East Helena.

Over 150 sawmills are actively engaged in preparing the logs for the timber products industry.

Government. Montana is governed under the constitution adopted in 1889.

The Governor, Lieutenant-Governor, Secretary of State, Attorney-General, Treasurer, Auditor, and Superintendent of Public instruction are elected for four years.

The legislative authority consists of a Senate and a House of Representatives.

At the head of the judicial department is the supreme court, composed of five judges, each elected for six years.

MONT BLANC, *moN' blahN'*. The highest mountain on the European continent, outside of the Caucasus.

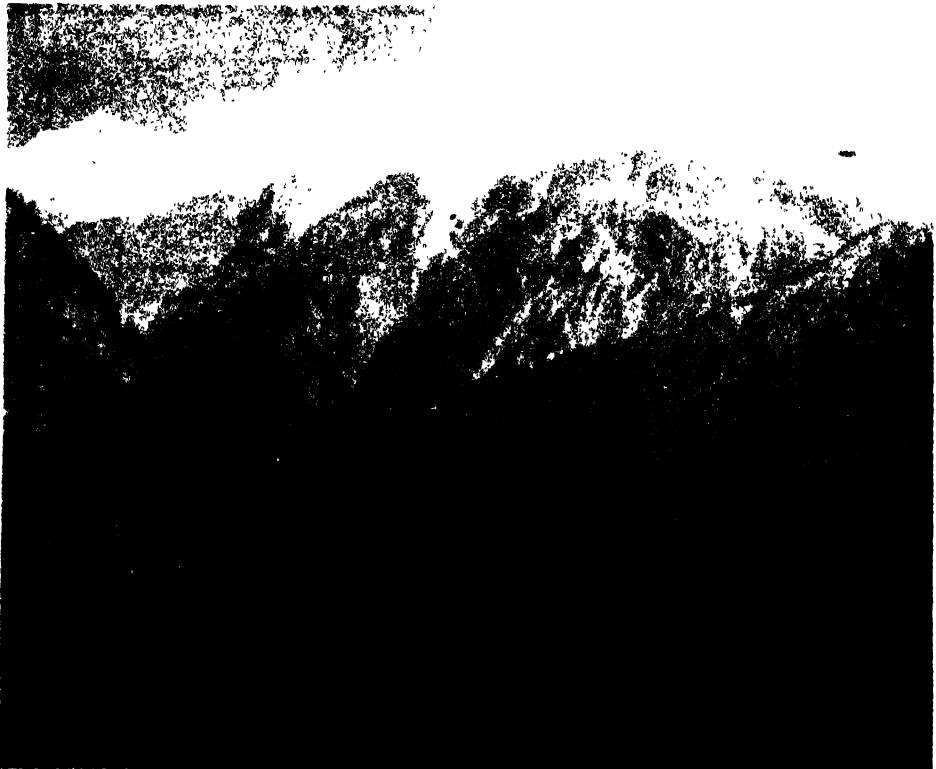
Its upper slopes and summits are clothed in glaciers and snow, whence its name (in French, "white mountain"). In the range of the Pennine Alps, it lies south of the vale of

Chamonix, in the province of Haute-Savoie, France, extending beyond the frontier into Italy and Switzerland. The highest of its several summits, which is in France, reaches a height of 15,782 ft. A suspended aerial railway carries passengers to an elevation of 9381 ft., opposite Grands Mulets. This section of the line was opened in 1927, but an extension to the peak of Aiguille du Midi, at an altitude of about 13,000 ft., is planned.

MONTCALM, *moN' kahm*, LOUIS JOSEPH, MARQUIS DE (1712-1759). A French general in the struggle between the French and English for supremacy in America. In 1756 he was appointed to the chief command of the



MONTCALM

MONT BLANC
Photo · F.T.O.

French forces in Canada. His operations against the English were at first brilliantly successful, including the capture of Forts Ontario and William Henry.

In July, 1759, the English commander, General Wolfe, gained the day against him at the Heights of Abraham and Canada was won for England. Wolfe died on the field in the moment of victory; his opponent, who was also mortally wounded, only lived until the next morning.

MONT CENIS, sé ne', TUNNEL. A railway tunnel which penetrates Mont Cenis, a peak of the Western Alps, lying between the Italian province of Turin and the French Savoy. The tunnel is at heights varying from 3775 to 4245 ft. It is 7.97 miles long, and was completed in 1870, the cost being about £4,000,000.

MONTE CARLO. See MONACO.

MONTE CRISTO. A small, rocky and barren islet belonging to Italy and lying in the Mediterranean; described in Dumas' romantic tale, *The Count of Monte Cristo*. It is 27 miles south of Elba, and consists chiefly of a mountain of granite, 2100 ft. in elevation. Monte Cristo remained uninhabited for many years, but a penal colony was established there in 1874.

MONTENE'GRO. Situated in the southern part of Yugoslavia, between Albania and the Adriatic, Montenegro formed an independent kingdom until 1918. It is a mountainous limestone land of poor fertility, with little scope for cultivation except in the valleys and along the coast, where maize, vines and fruits are grown. Cattle-rearing is of most importance. The area of the old kingdom was 3500 sq. miles. It was poor and had only a small export trade in pastoral products; there was no industry and no



MONTENEGRIN IN NATIONAL COSTUME

Photo: Yugoslav Travel Bureau

railway. Cetinje, the former capital, is little more than a village. The province of Zetska roughly corresponds with the old kingdom.

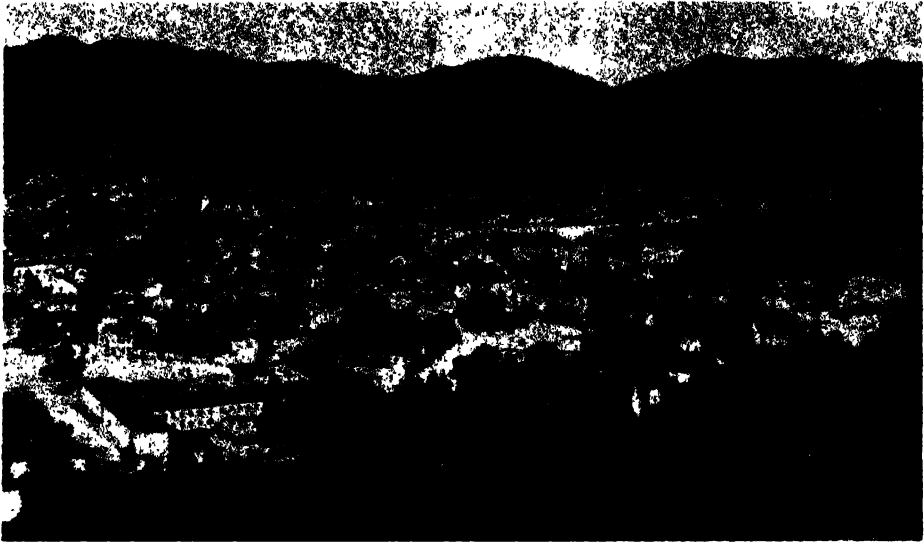
History. The Montenegrins are a branch of the Serbian Slavs, and during the Middle Ages Montenegro formed part of the Serbian kingdom. When that realm was conquered by the Turks in 1389 at the Battle of Kosovo, Montenegro became a small independent principality. In spite of continuous struggles with the Turks, the Montenegrins bravely upheld their independence through the centuries. From 1616 to 1696, the rulers of the country were elective prince-bishops, or *vladikas*, but for political reasons the succession soon became hereditary. Since the *vladikas* could not marry, the rule passed from uncle to nephew.

The first ruler of the Royal House of Petrovitch was the Vladika Danilo. In 1855, casting aside celibacy, he instituted succession from father to son, but was refused recognition by the Powers.



WATER PUMP, CETINJE

Photo: Fox



CETINJE

The old capital of Montenegro.

Photo: Yugoslav Travel Bureau

Danilo, who left no male offspring, was succeeded in 1860 by his nephew Prince Nicholas, who was later to assume the title of king. Years of intermittent warfare with Turkey followed, until in 1878, by the Treaty of Berlin, Montenegro's independence was formally acknowledged and its territory greatly enlarged.

Nicholas was a despotic but not unenlightened ruler. In 1906 he gave the country a Parliament and promulgated a new criminal code. In 1910 he assumed the title of king, under the name Nicholas I. Two years later, Montenegro joined Serbia, Bulgaria, and Greece in a war against Turkey, out of which developed a second war against Bulgaria (see BALKAN WARS). During the period in which Montenegro was fighting against the Austro-German invaders, King Nicholas pursued a devious policy of diplomacy, amounting to treachery, and few of his subjects grieved when he fled to France early in 1916. In October, 1918, the collapse of Austria brought about the liberation of the Montenegrins, and their Skupshtina, or National Assembly, deposed the king. The merging of the kingdom with the state of Yugoslavia, concluded in 1921, represented the desires of most of the people. See YUGOSLAVIA.

MONTE ROSA. A lofty, snow-clad mountain mass, situated in that portion of the Alps which forms the boundary between Piedmont, Italy, and the Swiss canton of Valais. It has eight main peaks, all more

than 13,000 ft. in height, and the loftiest of these, the Dufourspitze, is 15,217 ft. above sea-level.

MONTESPAN, *mon' les pahN*, MARQUISE DE (1641-1707). Daughter of the Duc de Montemart and maid of honour at Versailles, she became in 1668 mistress of Louis XIV of France. A generous patron of letters, she assisted, among others, Racine and La Fontaine.

MONTESQUIEU, *mon' les kü*, CHARLES DE (1689-1755). A French satirist and philosophical writer, whose *Persian Letters* won him immediate fame on their appearance in 1721. These letters purport to be the correspondence of two distinguished Persians travelling in France, and their criticisms of French life are no less noteworthy for their humour than for their justice. Other important works were a history of Rome and *The Spirit of the Laws*. Though he had satirized the French Academy in his *Persian Letters*, he was elected a member of that body in 1728.

MONTESSORI, *mon tes sor' e*, MARIA (born 1870). An Italian educationist whose theories of child training, developed after 1900, have been widely adopted in Europe and America. Maria Montessori was the only child of middle-class Italian parents. In 1894 she was awarded the degree of Doctor of Medicine by the University of Rome, being the first Italian woman to receive that honour. The first Montessori school was opened in Rome in 1907.

MONTESSORI METHOD. It was in her post-graduate days, during which she was



MARIA MONTESSORI

occupying the position of assistant doctor at the psychiatric (mental-disease) clinic of the university, that Dr. Montessori became interested in the treatment of feeble-minded children. Abandoning an already extensive private practice, she undertook the direction and reorganization of the State orthophrenic school, or asylum for deficient and feeble-minded children. This position she held for

two years, giving her services gratis.

From the first, Dr. Montessori felt that there was nothing in the methods she was using inherently limited to the instruction of deficient children. "While everyone," she writes, "was admiring the progress of my idiots, I was searching for the reason which could keep the happy, healthy children of the common schools on so low a plane that they could be equalled in tests of intelligence by my unfortunate pupils.

"I believed that these methods contained educational principles more rational than those in use . . . and that similar methods applied to normal children would develop or set free their personality in a marvellous and surprising way." This idea was shortly to take absorbing hold of her mind, and led to the renunciation of her work with deficient for the wider sphere of education of normal children.

She re-entered the University of Rome as a student in pedagogy and philosophy, also studying experimental psychology and making researches in the science of anthropology. In due course she accepted a chair in pedagogical anthropology at the University of Rome.

In 1906 the opportunity came to her of testing her ideas in a practical way. An industrial society had undertaken the reform of some of the badly constructed tenement dwellings in the poor quarters of Rome. The society provided the inmates with certain advantages, such a communal wash-house, baths, and sewing room, and also laid out the courtyards with trees, flower beds, and grassplots. The experiment was found to be a profitable one for the com-

pany, in addition to the benefit derived by the tenants.

In return for this, the inmates were required to keep their homes clean and in order, and to protect the walls, stairs, and courtyards of the building. It was found necessary, however, to provide some supervision during the day for the children under school age of the families in the tenement. A large room was therefore set aside in each tenement for the care of these infants during the day. This part of the scheme, under the fortunate title "Casa dei Bambini," or "Children's House," Dr. Montessori was invited to organize, and she accepted the commission gladly.

A second house followed shortly in the same quarter, and then a third in a better-class district of Rome. Schools using her methods, however, soon sprang up under many different authorities in Rome and in other parts of Italy.

Naturally, the new principles advocated aroused much interest in the educational world. Numbers of Montessori schools were established in England, many also in the United States of America, and others in France, Germany, and Switzerland.

The "Children's House." An ideal "Children's House," as Dr. Montessori conceives it, consists, not of one room only, but of several communicating with one another, and it would also have a garden. The rooms should include a gymnasium, a dining-room, and a little parlour, or common room, in which the children can rest or play when not at work in the large working room. Such ideal arrangements, however, are not essential to the practice of the method, and excellent results have been obtained in a single large room, even without a garden.

The children have charge of their house. They have to keep it clean and in order, wait upon themselves, and do all the practical operations connected with their life. They lay the tables for meals, wait upon one another at table, wash up, sweep the floor, wash the chairs and tables, brush the carpets and little mats which they use, clean their own shoes, and so on. The "Children's House," in fact, is really what its name implies, a house made for children, of which they have the main charge.

Dr. Montessori also insists that the objects which the children use shall be fragile, that is, not of the unbreakable pattern which it is common to give children to-day. The drinking tumblers are made of glass, the plates of china; the chairs and tables are light, so that they move and make a noise if the children knock against them. An environment of this kind is *sensitive* to the child's mistaken movements. The child who moves

badly and causes a chair to grate upon the floor is denounced by the resulting noise. The glasses and plates which he carries are breakable. Careless movements are thus revealed to him, and he tends to correct them and to perfect his muscular control. If, instead, the chairs and tables are heavy, or fixed to the ground, and the utensils which he uses are unbreakable, the child may make many mistaken or clumsy movements without being aware of them; this unawareness may persist for a long time, and may then form habits difficult to correct later, according to Dr. Montessori.

The Frames. One of the operations of practical life which the children learn to do for themselves is that of dressing and undressing. To assist them in acquiring this accomplishment, Dr. Montessori has designed a series of light wooden rectangular frames, to two opposite sides of which are attached pieces of cloth or leather, as the case may be, which can be fastened together, down the middle of the frame, by means of buttons, hooks and eyes, bows, lacing, etc.

The child can seat himself comfortably with one of these before him at a table, and practice the operation at leisure. All of the processes, such as buttoning, lacing, tying bows, etc., are difficult for the child at first. Practising them separately, therefore, isolated from the other difficulties with which they are combined in dressing, enables him to acquire skill in these movements much more quickly than if he only encounters the exercise in practical life. (Fig. 1.)

Dr. Montessori lays stress upon the exercises of practical life from still another point of view, namely, that they lead the child to become independent of the help of others. "In reality, he who is served is limited in his independence." This concept will be the foundation of the dignity of the man of the

future—"I do not wish to be served because I am not an impotent." And this idea must be gained before men can feel really free.

The Education of the Senses. In the Montessori method much importance is attached to the education of the senses. During the period of growth in which they are in process of development, Dr. Montessori has discovered that a number of "sensitive" or formative periods occur. That is to say, from the age of one and a half to about five years not only do the different senses become active, but the foundations of such faculties as memory, language, perseverance, will, and self-control are laid, and *once these periods have passed, the child never again has the same capacity either for developing fine sense discrimination or acquiring a number of mental and moral traits.*

In order to take the fullest advantage of the "sensitive" periods, Dr. Montessori has devised exercises which contribute to the education of the senses and at the same time are spontaneously attractive to the children, so that they repeat them with evident interest and pleasure, thus acquiring self-discipline and good mental habits without correction, other than is contained in the material itself.

The principle on which this material is offered to the children is that when a special "sensitive" period becomes active, the child will of his own accord select suitable material. This ensures that every child is engaged upon the work his particular stage of development requires, and it is remarkable to see a number of young children working actively with a sustained interest which often lasts many weeks.

The apparatus used in the education of the senses is too extensive to be here described in detail, but the following exam-

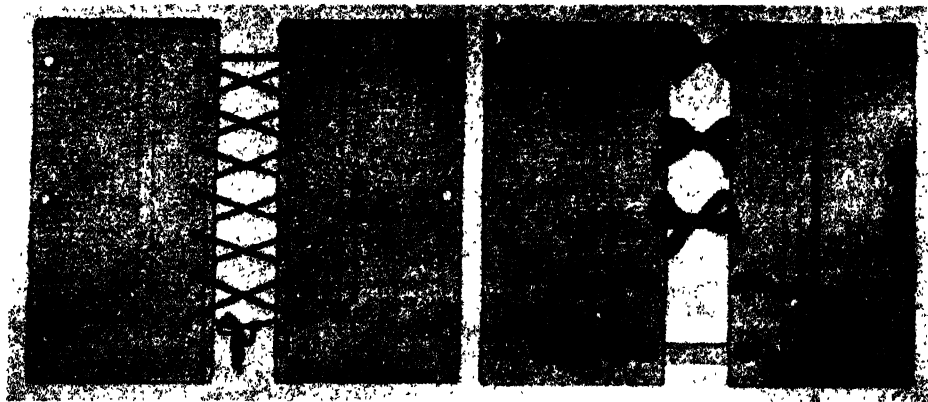


FIG. 1. FRAMES FOR EXERCISES IN LACING AND TYING

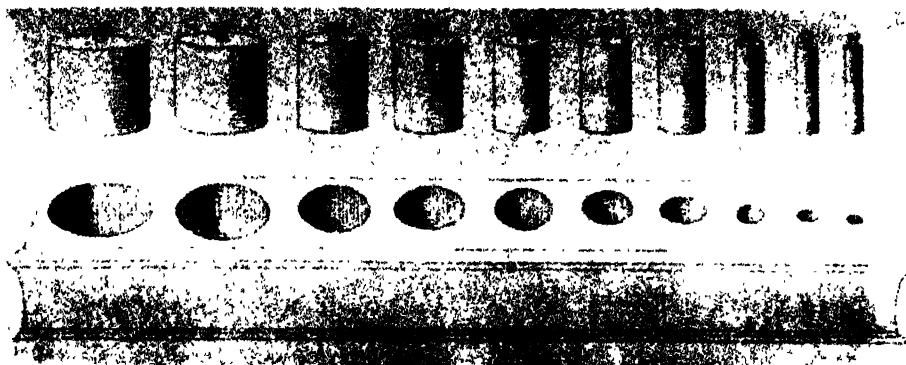


FIG. 2. FOR EXERCISES WITH WEIGHTS OR CYLINDERS

ples will illustrate its nature and the principles upon which it is based.

(a) *The Cylinders.* These, which may be given to the youngest children, consist of a series of ten wooden cylinders which fit precisely into a row of holes in a block of wood. They vary gradually in dimension, from the largest at one end to the smallest at the other. The child plays with these, taking them out of their holes, mixing them upon the table, and then striving to replace them. The exercise is one in visual perception, requiring the child to perceive similarities and differences of form. For children of two and a half to three years of age, this game has great fascination, and they repeat the exercise, taking out the cylinders and replacing them an indefinite number of times.

There are three blocks of cylinders; in one of these the cylinders vary in diameter only, in another in height only, and in the third in both dimensions. (Fig. 2.)

(b) *The "Long Stair," the "Broad Stair," and the "Tower."* These consist of (1) a series of ten rods, differing from one another in length by 10 cm. at a time, and forming a gradation from one of 10 cm. to one 1 metre in length; (2) a series of ten square prisms, differing in the side of their cross-section by 1 cm. at a time, from one measuring 1 sq. cm. in cross-section, to one having a cross-section 10 cm. square: the game with these consists in arranging the rods or prisms upon the floor or table, in order of gradation; (3) a series of ten cubes varying in size from one having an edge of 1 cm. to one with an edge of 10 cm. These are built one upon another in order of size, commencing with the largest at the bottom. (Figs. 3, 4 and 5.)

(c) *The Geometric Insets.* To train the eye in the perception of form, an apparatus is used consisting of flat geometric figures, cut out of wood, and fitting into corresponding holes in flat wooden squares, or "frames."

A selection from a large number of these, comprising circles of different sizes, squares, rectangles, triangles, and polygons, may be presented to the child, who has to take out the figures, mix them, and replace them in their corresponding apertures. To this exercise, which is one of vision, may be added an exercise of the muscular sense, the child passing the tips of his first two fingers around the contours of the figures and of the frames.

It is often found that a child who finds difficulty in replacing the figures by means of his sight alone, does so easily when he is assisted by other senses. (See Fig. 6), page 2841.

(d) *The Colours.* These consist of flat wooden spools, upon which are wound coloured silks. There are sixty-four colours in all, composed of eight series, or gradations. Each gradation contains eight spools of the same colour, but varying in intensity from light to dark. A double set of these colours is provided.

In the simplest exercise with these, the child is presented with two or more pairs of similar colours; for instance, two blues of the same shade, two reds, two yellows, etc. The game consists in mixing these upon the table, then finding the corresponding pairs and arranging them in couples. A more



FIG. 3. THE "LONG STAIR"

difficult exercise is that of arranging a series in order of gradation. To this may then be added a second series; then a third, and so on, till the child is able to sort a confused

heap of the whole sixty-four colours into a beautiful shaded "map" upon his table.

Other sense exercises include those for touch—rough and smooth surfaces, stuffs, etc.; little wooden tablets for the boric sense, or perception of weight; sound boxes and bells, beans, counters, Froebel cubes, or other objects for educating the stereognostic sense, or the muscular and tactile sense combined, by which we perceive the nature and



FIG. 4 THE "BROAD STAIR"

form of bodies in handling them. During many of these exercises, the children are blindfolded. This adds to their interest, and also fulfils a technical condition in sense training, namely, that the sense to be educated must alone be operative. Unless this is done, the child is likely to depend too much upon one sense—most frequently the sense of sight—and to sacrifice the fine development of the sense of touch.

Relation of Senses to Environment. One important aspect of this material for training the senses, according to Dr. Montessori, is the relation which it bears to the child's external environment. It will be noted that it represents, in a concrete and isolated form, the various qualities of colour, dimension, shape, and so on, of the objects which surround the child in his environment. The colours, for instance, which figure in his surroundings in every imaginable combination, with qualities of texture, form, dimension, and the like, are each represented in the colour tablets, in isolation from others, and confined to a single object of which they are the one characteristic. Forms are separated in the same way. The shapes which surround the child everywhere—the rectangle of the door, the circle of his plate, the ellipse of the table—are all represented in his geometric insets. Similarly, other qualities, such as high and low, long and short, thick and thin, are exemplified in the cylinders, the rods, and the prisms. Rough and smooth, and light and heavy, loud, soft, are all experiences encountered in his use of the apparatus.

The apparatus therefore represents an analysis of the environment, and the child's use of it serves in a sense as an explanation, or kind of "introduction" to it. As the child distinguishes the different sense impressions in his exercises, the teacher fixes the new idea in each case with a word, teaching him the names of the qualities he has perceived.

For instance, choosing an opportune moment, she takes two of the colour spools with which the child has become familiar in the exercise of pairing the colours, say a red and a blue one, and laying them before the child, she holds them up, attracting his attention to them in turn, and saying simply, "This is blue," "This is red." She emphasizes the word *red* or *blue*, or repeats it to fix it well in the child's mind. After a pause, wishing to test if he has understood, she says, "Give me the red," "Give me the blue," and if the child responds correctly, she proceeds to the third period of the lesson, asking, "What is this?" "Blue." "And this?"

In this way the child learns a large number of general names referring to the qualities of objects in his environment; large, small, high, low; light, dark, round, square, oblong; rough, smooth; and so on. Recognition of these in his surroundings is a further step, and with normal children generally comes spontaneously. For instance, having done the exercise in feeling the qualities of different stuffs, the children will at once seek similar experiences about them. A visitor may be surprised by the approach of a child who lightly takes hold of the stuff of her dress, feeling it between his fingers with evident pleasure. The sky is blue, the window is a rectangle; and these little discoveries come as a surprise to him. He feels a joy akin to that of a real discoverer, and this prompts him to further observation of his surroundings. The children with senses already educated become spontaneous observers, and the discoveries which they make fill them with enthusiasm.

Scientific Aspects. The educational method described will be seen to have its origin in a different conception of the function of education, and to exert a different effect upon the individual from that of the earlier pedagogy. In this method it is the inherent forces of growth and development present in the individual which are the central points of attention. It is to help and nourish these forces, providing them with the stimulus which they need, and leaving them free in their development, that is the central aim. All



FIG. 5.
THE "TOWER"

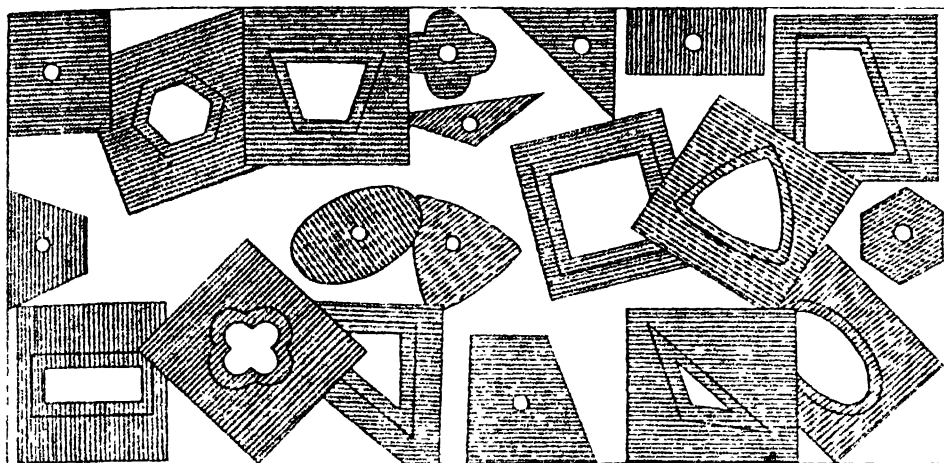


FIG. 6. EXERCISES IN GEOMETRIC INSETS

the particulars of the method revolve about this. The child is no longer looked upon as passive material in the hands of the educator. The earlier methods spoke of "developing character," "awakening interest," "inculcating the moral sentiments," etc.

In the Montessori method the individual is regarded as a being who contains in himself the forces needed for his development, and who must himself evolve according to his own laws. The function of education is to study and observe these, tenderly nursing, so to speak, the growing life, providing it with the means of growth, the psychic stimuli which it needs, and waiting and observing.

MONTEVERDE, *mon tch vair' deh*, CLAUDIO (1567-1643). Italian composer, of importance in the history of music; foremost member of a group of musical rebels whose main achievements were twofold. The first of these was peculiarly Monteverde's, and consists of the use of *unprepared discords*. Though not without precedent in long-forgotten periods—the Welsh Bardic music, the medieval music of Perotin, etc.—this practice was a complete innovation in Monteverde's age.

To prepare a discord, it is necessary first to sound a concord; next to cause one part or voice to move to a discordant interval; finally the discord is resolved by causing the other part in the discordant interval to fall to an interval once more concordant, the first part meanwhile remaining unchanged. Monteverde uses the discordant intervals of the *seventh* and the *ninth* without this preparation, although he does not fail to resolve them in the normal manner. In so doing, he struck an undoubted blow

at the old contrapuntal style, whose effect depends on the logical interweaving of parts, producing harmony by their own orderly movement, and not in such arbitrary ways as Monteverde's new tactics rendered popular.

The second achievement of Monteverde's group belongs more properly to the story of Opera. It consisted of the development of a form of *recitative*, or musical monologue accompanied only by a few bare chords.

Monteverde's main compositions consist of several books of Madrigals, in which harmony, not counterpoint, is already to the fore, and his series of successful operas, of which *Aranna*, *Orfeo*, *Il Ritorno di Ulisse*, and *L'Incoronazione di Poppea* were the chief.

See MUSIC.

MONTEVID'EO. Capital city of Uruguay. See URUGUAY.

MONTEZUMA, *mon te zu' ma* (about 1470-1520). The last ruler of the Aztecs of Mexico and their leader against the Spanish conqueror, Hernando Cortez. See CORTez.

MONTFORT, SIMON DE. See LEICESTER EARLS OF.

MONTGOLFIER, *mon gol' fyeh*, BROTHERS. Makers of the first balloon. See BALLOONS.

MONTGOMERYSHIRE (*gum'ri*). A county of North Wales, with an area of 510,110 acres and a population in 1931 of 48,462.

Physical Features. The county consists entirely of hills and moorland, intersected by fertile river valleys. Save for its mountainous borders, it offers little of the grandeur of Merioneth or Caernarvon, but its fertile and wooded slopes have great natural beauty. Until the World War it was the

best wooded county in Wales, and its oak was formerly much used in the construction of warships. The merciless timber cutting of the war years have left much of the hillside denuded, though efforts are being made by the Forestry Commission to reafforest many parts of the county.

The principal rivers are the Severn and the Dovey, each of which is, however, enriched with a number of tributaries. The Severn rises in the Plynlimon Mountains on the Cardigan border and flows south-east across the county into Shropshire. The Dovey only touches the north-west corner, flowing into Cardigan Bay on the west. The Vyrnwy is a confluent of the Severn, rising on the north-west border and discharging into the Severn after being joined by a number of tributaries, the principal being the Einion and the Tanat. The only high mountains in the county are on the borders. At the most northern point is Moel Sych, rising to 2713 ft., forming part of the Berwyn range. On the south-west border rises Plynlimon (2469 ft.), while on the Shropshire border rise Breidden Hills (1324 ft.) and the Long Mountain (1338 ft.). The southern border is formed by the range of the Kerry Hills, from the highest point of which, Kerry Pole, a magnificent view can be obtained, looking northward, of Cader Idris, Snowdon and the surrounding mountain ranges. In the north is Lake Vyrnwy, five miles in length and the largest in Wales, which is an artificial construction, dating from 1881-1892 and designed to form a reservoir of over twelve million gallons for the supply of Liverpool. The climate of the county is mild, and except in the mountainous parts, which receive 60 to 80 inches annually, rainfall is normal.

History. Little is known of pre-Roman Montgomeryshire, or Powis, except that it was inhabited by the Ordovices, a fierce tribe, who were among the last to be subdued by the Romans, who occupied the county from the first to the fifth centuries. It is generally believed that the final defeat and capture of Caradoc by Ostorius in A.D. 51 took place at the Breidden Hills, near Welshpool, called by the Romans the Montes Ardui. With the departure of the Romans and the rise of the dominion of Cui edda in the north of Wales, the county fell to his dominion, under the name of Powis or Powys, though ruled by its native ruling dynasties. In the sixth century the Pelagian heresy was finally vanquished by Saint Garmon, to whom is mainly due the unification of the church in Powis, and who is rightly regarded as the first of a long line of saints of the sixth and seventh centuries. In the early ninth century, with the downfall

in 820, in an attack by Cynwulf of Mercia, of Cyngen, ruler of Powis, the dominion over Powis passed to Mervyn, prince of Gwynedd in the south, to whom Nesta, sister of Cyngen, had been married; and for two centuries Powis was to be a suzerainty of Gwynedd. During this time, its administration most frequently was left in the hands of Stewards. By the time of the Conquest, the native rule of Bleddyn had been reinstated, but proved too weak for the struggle with English or Norman lords which future centuries were to bring. In 1072 Roger de Montgomery built his castle near Kerry, and from him the present name of the county derives. Partly by treaty, partly by conquest, Norman power became paramount, the seal being set in the thirteenth century by the rule of the Mortimers as Lords Marchers. In the fifteenth century the county was the scene of the principal episodes of the dramatic rise of Owen Glendower, who won his principal victories within the county and held his famous parliament (1402 or 1405) at Machynlleth, where he had his principal residence. The present county was created after the Act of Union of 1535. In the Civil War, sympathies were mainly royalist, and Montgomery Castle was held for the King in 1644.

Antiquities. There are numerous Bronze Age hill forts in the county, notably Gaer Fawr and the Breiddens. There are Roman stations, notably at Caersws, at Gaers near Forden, and in the Plynlimon country. The old Roman trackway Sarn Helen is supposed to pass through Newtown and the Severn valley. Roman relics are not found west of Caersws. The eighth-century Offa's dyke, built by Offa, King of Mercia, is on the eastern border. The county is justly famous for its many "Magpie" timbered mansions, in which the dark oak beams are used to make a decorative pattern on the white walls. The churches are some of the finest in Wales, and excellent carving, window glass and fonts are to be found in very nearly all.

Occupations and Industries. Agriculture is by far the most important occupation, and together with gardening and forestry here forms the main source of livelihood. Horse and sheep breeding are an important occupation, the peculiar small Kerry sheep, bred on the hills in the south, being justly famed for wool and mutton. There is some stone and slate quarrying near Forden, Welshpool and Machynlleth. Some leather is tanned at Llanllwchaearn.

Communications. The G.W.R. and L.M.S.R. both serve the county with express services to Welshpool, and the main route to Aberystwyth passes Montgomery, Newtown

and Machynlleth. There are also branch lines controlled by the Great Western Railway. Of recent years motor coach services have developed. The Great Western Railway has regular services from Machynlleth to Dolgelley and Aberystwyth, and from Welshpool to Oswestry and Dinas Mawddwy, but on weekdays only.

The county seat is—

Montgomery, a Municipal Borough, but now little more than a village, population (1931) 918. It is quaintly perched on the top of a steep hill and was originally surrounded by walls. Of the original castle built by Roger de Montgomery in 1072 nothing remains, and even the site is uncertain. The present castle is thirteenth century at the earliest, and is remarkable mainly for the strength and inaccessibility of the site chosen for it. The castle was besieged by the Parliamentary army in 1644 and fell into their hands, to be later dismantled. The church is mainly fourteenth century, though portions are said to be earlier. George Herbert, the poet, and his brother, Lord Herbert of Cherbury, the poet and theologian, were born in Montgomery. The borough charter dates from the fifteenth century. The county assizes are held at Welshpool.

Other important towns are—

Welshpool, a Municipal Borough, with a population of (1931) 5637, an English-looking red-brick and quite uninteresting town, in the valley of the Severn. Formerly of note as a flannel market, its principal importance to-day is as a railway junction for the L.M.S.R. and the G.W.R. Powis Castle (Castell Coch) is just outside the town, and is a reconstruction and modernization of a fourteenth-century building. There are remains of the earlier Lady's Mount, and an amotte-and-bailey castle, of which little is known. The present castle is mainly interesting for its magnificent grounds and park, laid out by Capability Brown.

Llanidloes, a Municipal Borough, with a population (1931) of 2356, mainly important as a centre for the flannel industry. It was a centre of the nineteenth-century industrial disturbances, and there were Chartist riots here in 1839. The Old and New Market Houses in the centre of the town are interesting buildings. The Church is beautifully situated above the river, and contains a remarkable hammer-beam roof.

See MACHYNLLETH.

MONTH. One of the twelve parts into which the calendar year is divided. It has several other applications. An astronomical month is the period measured by the motion of the moon. The revolution of the moon from perigee to perigee is called the *anomalous month*; it has an average length of

27 days, 13 hr., 18 min., 37.4 sec. The *sidereal month* is the period during which the moon, if viewed from a fixed star, would seem to make a complete revolution around the earth; this month is 27 days, 7 hr., 43 min., 11.5 sec. The *proper lunar month*, often called the *synodical month*, is the period from one new moon to the next, an average of 29 days, 12 hr., 44 min., 2.8 sec. Another astronomical month is the *solar month*, which is the time taken by the sun to pass through one sign of the zodiac.

The length of a calendar month is fixed arbitrarily.

Days of the Month. In the Gregorian calendar, each day of the month is known by a number, as the first, or the second, or the twentieth. The ancient Greeks divided the month into three periods of ten days, and the French Revolutionary calendar, in which all the months were of equal length, used the same system; thus the 15th day of the month was called the 5th day of the second decade. The Roman calendar had three fixed days in each month, the *calends*, the *nones*, and the *ides*. From these fixed days, the Romans counted backward. The *calends* were invariably the first day of the month; the *ides* were at the middle, either the 13th or the 15th day, and the *nones* were the ninth day before the *ides*, both days being counted.

MONTREAL, QUEBEC, CANADA. Situated on an island at the confluence of the Ottawa and St. Lawrence rivers, in the south-east of Quebec province, Montreal is Canada's largest city, and until 1847 was the seat of government. It is 164 miles south-west of Quebec, 950 miles from the Atlantic Ocean by way of the Strait of Belle Isle, and 420 miles by rail north of New York. The population (1935) is 850,000. The island of Montreal, on which the city is situated, is about 30 miles long and 10 miles wide at its widest point. Its most striking physical feature is Mount Royal, whose summit is 753 ft. above sea level, and from which the city takes its name. Part of the city is terraced on the mountain slope.

Greater Montreal extends along the river front for about 9 miles, and from 4 to 7 miles back from it. The town plan adopted in 1672 has been, in most parts, rigidly followed.

Montreal was founded by the French, and for many years it was wholly a French city. Of recent years there has been a very large immigration from Europe, which has made Montreal one of the most cosmopolitan of cities. The Jews (largely Russian and Polish) now form a considerable portion of the population. There are large colonies of Italians and Russians, with a considerable



GENERAL VIEW

resentation of many other races of southern Europe, and a number of Syrians.

French now constitute over 70 per cent of the total population. English settlers and their descendants make up a large part of the remainder. English is spoken throughout the city, though French predominates in the east and English in the west.

There are a number of beautiful churches. The Cathedral of Notre Dame, facing the Place d'Armes, and St. James's Cathedral are the two of greatest interest.

Education.

Montreal has two distinct school systems, Roman Catholic and Protestant, with separate boards of commissioners. The leading educational institution of the city is McGill University. The University of Montreal, formerly Laval University, occupies a position in the Roman Catholic system of

schools similar to that occupied by McGill in the Protestant system.

Transport and Industries. Montreal is the chief commercial centre of the Dominion of Canada, and its port is the second largest on the American continent.

It is the natural port of exchange between ocean and inland navigation, and not withstanding the fact that its harbor is open only seven months in the year, over a quarter of the total export trade of Canada passes through this port.

The city is served by the Canadian National and the Canadian Pacific railways, as well

as by several lines from the United States. The leading products include textiles, leather and leather goods, tobacco and tobacco products, iron and steel goods, paper and flour.

History. The site of Montreal was first brought to the attention of white men in



MCGILL UNIVERSITY, MONTREAL
Photo Canada Pacific Railway



DOCKS AND SHIPPING AT MONTREAL
Photo (Canadian Air Force)

1493, in which year Jacques Cartier sailed up the St. Lawrence and discovered the hidden town. Cartier never returned, and the next visitor, Samuel de Champlain, arrived in 1601. Champlain at once recognized the advantage of the place as a trading-post and a site for a future city. The city was founded in 1642 by Jean de Chomedey, and named Ville Marie de Montreal. Actual incorporation did not begin until 1853.

For the next century, its growth was slow. By the Treaty of 1763, all Canada passed to the British Government. In 1775-1776 the city was occupied by American revolutionary soldiers, but the Canadians refused to side with the colonists. Separate articles on Canadian education, transport, industries, etc., are in the Dominion's Volume.

MONTROSE. A Burgh of Angus, with a population in 1931 of 10,196, situated on the North Sea, 488 miles from London, and served by the main east coast line of the L.N.E.R. and a branch line of the L.M.S.R. Industries include brewing and milling, fish-curing, flax-spinning and jam-making. The port is used by coasting vessels, and is the centre of an important fishing industry.

The town was a seaport in early times, and its first recorded name was Celurca. In the Middle Ages it was at Montrose that Sir William Wallace landed from France in 1303, while in 1600 it was the scene of the General Assembly of James VI. In the first Jacobite Rebellion of 1715, King James VIII was proclaimed at the Cross of Montrose. The surrounding country has much natural beauty.

MONTROSE, DUKES AND MARQUESSSES OF. The family of Graham is an ancient one, Sir William de Graham having been granted lands by David I early in the twelfth century. Living just south of the Highland Line, the Grahams were inevitably warriors; unlike many of the Scots nobility, they maintained a fine record of loyalty. Sir John Graham of

Dundaff was killed fighting for Wallace at Falkirk. Sir David Graham of Kincaid served Robert Bruce, receiving in reward the lands of Old Montrose. Succeeding Grahams served the Crown, an exception being Sir Robert Graham, who led the murderers of James I. Cadet branches were the Earls of Montrose and the Grahams of Claverhouse, most famous of whom was the "Bonnie" Dundee, killed at Killbuckran in 1689. The head of the family gained the honours of Lord Graham in 1451 and of Earl of Montrose in 1504, the first Earl being killed at Flodden. John, third Earl (1638-1608), was Chancellor and Viceroy of Scotland to James I of Great Britain. John, fourth Earl, lived quietly on his estates, married Margaret Ruthven of Gowrie, and died in 1626, shortly after his appointment as Lord President of the Scottish Council.

JAMES GRAHAM, 1st Marquess of Montrose (1612-1650), was sent at the age of twelve to the College at Glasgow. Ten years later, on his father's death, he entered St. Andrews, where he studied the classics. He was a golfer, a fine horseman and a skilful archer. He married Magdalene Carnegie in 1628—a love match. From 1633 to 1639 he travelled in Europe.

In 1638 Montrose signed the Covenant to defend the Kirk against Laud's new liturgy and took part in the "Bishops' Wars", but he was no revolutionary, and he opposed the Covenanters' alliance with Pym's party, inspired by Argyll. For this he was imprisoned for some months in Edinburgh Castle.

When Scots Presbyterianism took arms for the Parliament in the Solemn League and Covenant of 1643, Montrose, who was a spiritual not a political Covenanter, joined Charles at Oxford and offered to raise Scotland for the King. He was created a Marquess, appointed Lieutenant-General, and sent out early in 1644 with a small command

of horse. After an unsuccessful attempt on the southern Lowlands and some campaigning in northern England, his small force was absorbed by the army of Prince Rupert, recently defeated at Marston Moor. Montrose now decided on an apparently crazy venture; with only two companions, Sir William Rolls and Colonel Sibbald, he set out to conquer Scotland.

Disguised as Covenanting troopers, they safely reached the Highland Line. At Blair Atholl Montrose found about a thousand veterans come from Ireland, Macdonnells of Antrim and Macdonalds, their kinsmen, driven from the Isles by the Campbells. Their leader was Alasdair Macdonald of Colonsay. Montrose in his ensuing campaigns recruited from the many Highland clans that hated the Campbells—Camerons, Stewarts, Macleans and others—but all these were liable to return home after a victory, and the Irish were the core of his force. Muskets were few, munitions scarce. Later he acquired a few cavalry. His ragged troops, however, could march at speed over the roughest country in any weather and needed no supply train; he was to prove himself the finest British commander of his time.

An amazing series of victories followed against larger and better armed forces. Tippermuir was won by the Highland charge. Aberdeen fight was tarnished by the sequel, Montrose, furious at the shooting before battle of a drummer-boy accompanying his flag of truce, promised his Irish the sacking of the city, which meant much looting and some massacre. Inverary was ravaged, and a brilliant strategical march over the winter hills surprised the Campbells at Inverlochty and broke the military power of the clan. With a small force he took Dundee, but during the pillage was surprised by a large army under Baillie, an experienced general; Montrose not only drew off his exhausted, intoxicated troops, but out-manoeuvred Baillie in a night march and reached the hills in safety. He now had some Gordon cavalry and he used them in the shock tactics learned from Rupert; this battle, at Auldearn, proved him as great a tactician as he was a strategist. The victory of Alford was dimmed by the death of young Lord Gordon, a close friend to the Marquess. At Kilsyth, a year after he had left England, he destroyed the last Covenanting force in Scotland.

Montrose entered Glasgow in triumph. The Lowland gentry came to swear loyalty, and the Border Earls promised powerful reinforcement. Master of Scotland, he made arrangements for government, issued a royalist manifesto, and prepared to lead an army over the border to the King's aid.

The Lowland recruits, however, were still more promise than performance, and his veterans had melted. Half the Irish were ravaging Argyllshire. The Highlanders had joined them or gone home. At Philiphaugh, Montrose, misled by hostile countryfolk and betrayed by those who had promised aid, for a while held up David Leslie's six thousand with six hundred men. Then he escaped to the highlands, where his efforts were hampered by the uncertain aid of Lord Huntley, head of the Gordons. In 1646, in obedience to the King, he retired abroad, where Cardinal Mazarin and the Emperor both offered him a Marshal's baton.

He landed in Orkney with a few hundred Danish troops in 1650 and crossed to the mainland, but he received little help from the north-east, and cavalry scattered his force at Carbisdale. He was betrayed by Neil Macleod of Assynt, and hanged in Edinburgh by the covenanting lords.

Charles II restored the title to his son James, whose grandson was created a duke for his work in effecting the Parliamentary Union of 1707. The family adopted the Hanoverian cause. The title is still held in the direct line.

MOOD. A mood of a verb is a group of tenses having similar meaning. There are three moods. (1) the indicative, (2) the imperative, (3) the subjunctive.

(1) The indicative mood is used for all statements of fact and for questions.

(2) The imperative mood is used in commands and entreaties. The subject, which is generally not expressed, is always in the second person. (You) *give me the letter.*

(3) Whereas the indicative mood states a fact, the subjunctive is used to assert something as being merely thought of as possible or desirable. The subjunctive mood has been gradually falling out of use in English, and to-day it is far less frequently used than in other languages. In simple sentences and main clauses it occurs only in such survivals as "Long live the King," "*Be* that as it may." The following are examples of its use in subordinate clauses: If I *were* you, I should not do that; I wished he *were* there; I shall certainly attend, lest it *be thought* that I am afraid to meet them; It is suggested that this paragraph *be omitted* from the letter.

In many sentences the verbs *may*, *might*, *shall*, *should*, *would*, together with an infinitive without to are used as subjunctive-equivalents; e.g. He hopes he *may come*.

MOON. The only satellite of our planet. It was generally believed that the moon was one of several planetary bodies formed from a vast rotating nebula, and was cast off from



NORTHERN PARTS OF THE MOON

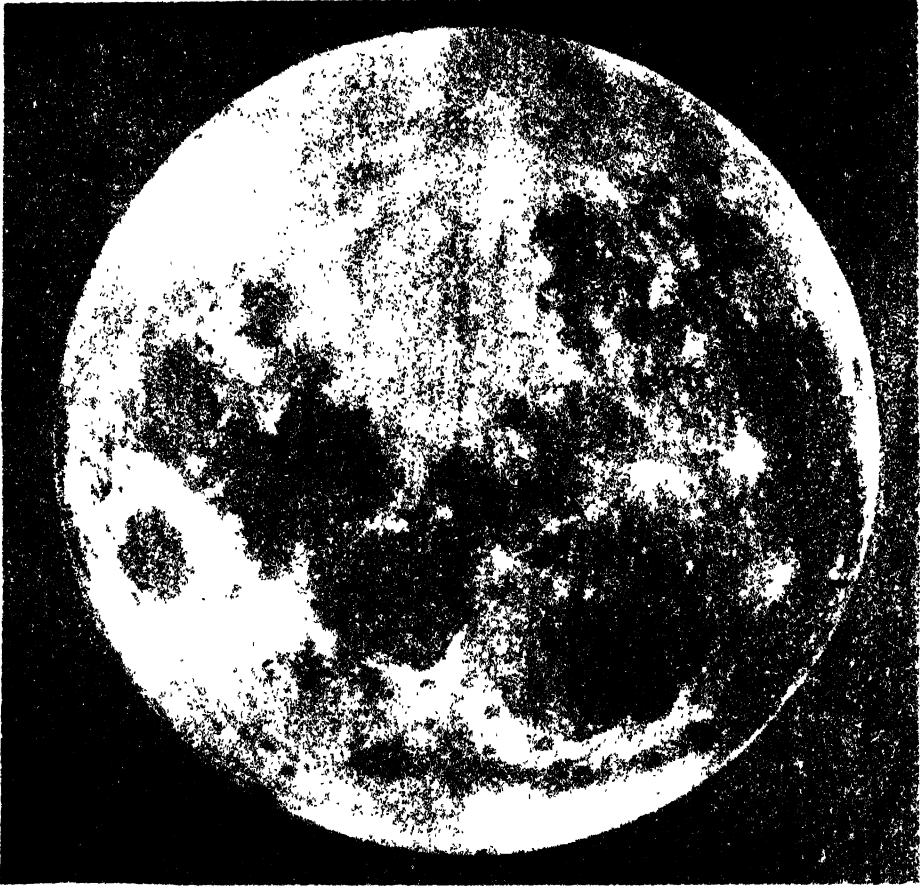
The great lava plain (Mare Imbrium) is shown, with its "island" craters.

Photo: U. & U.

the earth in the same way that the earth was evolved from the sun (see **NEBULAR HYPOTHESIS**). In 1900 a new planetesimal hypothesis was advanced. It was conceived that the moon and other satellites of the solar system originated in knots of matter shot off from the parent sun by the gravita-

day. The moon is receding from us at the rate of 7 ft. a century.

Orbit, Size and Distance. The moon moves in its orbit round the earth in 29 days, 12 hr., 44 min., 2.8 sec., if we reckon its path with reference to successive overtakings of the sun. But calculating the path with reference



THE FULL MOON
Showing the depressed plains, or "seas."
Photo U. S. N.

tional influence of a passing star. These knots grew by the infall of swarms of tiny particles, or planetesimals, and revolved about larger knots of matter, which in turn grew by capturing planetesimals. These larger bodies formed the planets. This planetesimal hypothesis is not universally accepted.

The gravitational pull of the moon, which causes the tides, brings about on the earth a friction which tends to slow down its motion, thus very gradually lengthening our

to a fixed star, as both are seen projected on the sky, we find that it completes its revolution in about 27½ days. These periods of revolution are known, respectively, as the *synodic* and the *sidereal*. The moon's diameter is 2160 miles. Its average distance from the earth is 239,000 miles. In volume the moon is $\frac{1}{81}$ that of the earth. Its density is 3.3 times that of water, the density of the earth being 5.5.

Atmosphere. The moon possesses no light of its own, and all the heat it has it borrows

from the sun. If there is an atmosphere surrounding the moon, it is extremely attenuated and would not support life, as the people of the earth understand life. The temperature on the surface of the moon is estimated at about 100° F. below zero for two weeks of every month. For the other two weeks, the direct rays of the sun probably raise the temperature near its equator at least as high as that of boiling water. It is obvious that no human being could exist under such conditions.

Weight on the Moon's Surface. The attraction of the moon is only one-sixth of that of the earth. An object dropped from a height above the earth will travel toward the earth at the rate of 16.08 ft. the first second. If dropped above the surface of the moon, it would travel only at a rate of 2.7 ft. the first second. A strong man on earth who can easily lift and raise a 50 lb. weight over his head with one hand could perform the same feat on the moon with a weight of 330 lb. It is this smallness of gravitational force that prevents the moon's clinging to itself an appreciable atmosphere, but it is sufficient to cause tides on the earth.

Its Light. At the full moon, the light reflected by it is about $\frac{1}{100,000}$ part of the light of the noonday sun. The surface of the moon appears white, but in reality it is a dark brown. The light of the moon is sent to it direct from the sun. It is then reflected from the moon to the earth, the amount varying according to the relative position of earth and moon. The moon occupies a curious position in the solar system. It rotates on its own axis, also revolves round the earth, and with the earth revolves round the sun. Since the period of rotation and period of revolution are of the same duration, the same face or side of the moon is always turned toward the earth.

Phases of the Moon. In its journey round the earth, the moon presents varying portions of its illuminated side toward us, and the changes that take place through its alternate waxing and waning are called its *phases*. The actual new moon is invisible, its dark side then facing us. Gradually, the crescent widens until, about the seventh day after new moon, the moon is a half circle, being then at *first quarter*. Relative to the earth, the moon is then at right angles to the direction of the sun. About seven days later, the whole circle is illuminated, for the sun, earth, and moon are all in a straight line, and the illuminated half of the moon is turned directly toward earth. This is *full moon*, or *second quarter*.

Proceeding easterly in its orbit, the moon, in another seven days or so, reaches a point at which it is at right angles to the direction of

the sun, and is again seen as a half circle. From this *last* or *third quarter*, it reaches, in about another week, the position where it is in a line with the earth and sun, with the dark side earthward, and therefore invisible.

Variations of Motion. The orbit or path of the moon round the earth is ellipsoidal, but constantly changing in its form. The line of apsides, or points of least and greatest distance from the centre of motion, continually changes, performing a complete revolution in a little less than nine years. At the time of the new moon, the distance between sun and moon is at the lowest, and the moon is said to be in *conjunction*, at the full moon, it is farthest away from the sun, and is in *opposition*. In its motion the moon is continually oscillating, making the movements which are called *librations*. Therefore we see really more than half of the moon's surface. Only 41 per cent of the moon is never visible to us, and a belt of about 18 per cent at the edge of the moon is alternately visible and invisible, owing to the oscillation.

Craters. Studied through a telescope, the surface of the moon appears to be marked with craters of extinct volcanoes, some of them having walls 20,000 ft. in height. Some astronomers do not attribute the so-called craters to volcanic action, but think the formations are due to the impact of meteors crashing down on the moon. It should not be forgotten that leveling processes, such as have occurred on the earth, cannot take place on the moon owing to the lack of water and atmosphere.

The use of the camera, in conjunction with giant telescopes, has allowed painstaking and accurate surveying of the moon's surface.

Moons of other Planets. Jupiter has nine, two having retrograde movement. Mars has two, smaller than those of Jupiter. Saturn has nine moons, possibly ten; the largest, Titan, is 2500 miles in diameter, or somewhat larger than our moon. Uranus, a planet which is 1,800,000,000 miles distant from the sun, has four moons, all of which revolve backward.

MOONSTONE. A milky, bluish, opalescent variety of feldspar, used as a gem. Stones, which are found mostly in Ceylon, are always cut in cabochon form to display the moving sheen which the better specimens possess. Moonstone is considered the birthstone for those born in September. See **FELDSPAR**.

MOORE, SIR JOHN (1761-1809). A British soldier whose heroic death made him a national hero. Born at Glasgow, Moore entered the army as a lad of 15, serving with marked distinction in campaigns in the West Indies, Ireland, Holland and Egypt. In 1808, at the head of 10,000 men, he was

sent to reinforce the British command in the Spanish peninsula. He contemplated a



SIR JOHN MOORE
(National Portrait Gallery)

junction with the forces under General Romana, but his plan was frustrated by the failure of the Spanish commander to co-operate promptly. At Salamanca, word reached him that Madrid had fallen and that Napoleon was marching with a superior force to crush him. Compelled to retreat, Moore succeeded in reaching Corunna after a hurried

march across desolate mountains in the unfavourable weather. Here, however, the French forced him to give battle. Moore was struck by a rifle ball and fell, just as his troops were achieving victory.

Sir John Moore was a fine trainer of men, by developing their moral qualities rather than by flogging. His influence was felt by both the rank and file and the senior officers under his command.

MOORE, THOMAS (1779-1852). An Irish poet who wrote some of the best-loved songs of his own and succeeding generations. To

Thomas Moore we are indebted for such old favourites as *Believe Me If All Those Endearing Young Charms*, *The Last Rose of Summer*, *Oft in the Silly Night*, and many others. Their author was born in Dublin, educated at Trinity College, and in 1799 went to London to study law, but soon showed his preference for literature. In 1800 he published a translation of *Anacreon*, the



THOMAS MOORE
Photo: Brown Bros.

Prince of Wales accepting the dedication of the poem. *The Poetical Works of the Late Thomas Moore* was his next venture, the name being suggested by his own diminutive stature. He was appointed registrar of the admiralty court in Bermuda in 1803, but tired of the monotonous life, and the next year, after appointing a deputy, returned to

England by way of the United States and Canada.

In 1807 he wrote the first of the *Irish Melodies*, his best creations, which appeal not only to the Irish nation, but also to the Anglo-Saxon race. *Lalla Rookh*, an Eastern romance in verse, was written with the aid of books on Oriental themes. It was published in 1817. In 1809 Moore went to Italy, but he returned to England in 1822, and spent his last years in Wiltshire. Among his other works are *Life of Sheridan*, *Life of Lord Byron*, *The Epicurean*, *History of Ireland*, and humorous verses entitled *The Fudge Family in Paris* and *Loves of the Angels*.

MOOR-HEN OR WATER-HEN. A common bird belonging to the rail family (see RAIL), which is characterized by scalloped toes. The moor-hen can be distinguished by its red forehead and white undertail. The coot, which belongs also to the rail family and is closely related to the moor-hen, has



MOOR-HEN
Photo: E. J. Hoshing

a white forehead. The moor-hen usually builds a nest of reeds or flags on a clump of rushes or under a bush close to some stream or pond. On the average between seven and eleven dull buff eggs with reddish spots are laid. The bird swims and runs well and is capable of long sustained flight. The moorhen is common in most parts of the world. See GALLINULE.

Scientific Name. The moor-hen belongs to the rail family, *Rallidae* and bears the name *Gallinula chloropus*.

MOORISH ARCHITECTURE. See MOHAMMEDAN ARCHITECTURE.

MOORS. A general name applied to all Mohammedans who speak Arabic and who live in the Barbary states of North Africa. An organized state existed in what is now Morocco as early as 100 B.C. The Arabs overran this country in the seventh and eighth centuries, converting the inhabitants to the Mohammedan religion by force of arms, after a long, strenuous resistance. The Arabs crossed the Mediterranean and passed through Spain into France, where they were checked at the battle of Tours in 732 by Charles Martel. They then turned back into Spain, where they founded a colonial empire, making the Christian Spaniards a subject and enslaved people. During the time known as the Dark Ages, science and art and literature flourished under the patronage of the wealthy Moors. The rule of the Moors was not accepted peacefully, and through many centuries the princes of Christian states in Spain waged a ceaseless war with the aliens, gradually forcing them back until, at the time of Ferdinand of Aragon and Isabella of Castile, the Moorish kingdom had become limited to Granada, where the Alhambra was their stronghold; and in 1492, while Columbus was sailing westward toward the New World, the armies of Ferdinand and Isabella conquered Granada. The Mohammedan Moors were driven out, but those who wished could remain in Spain by changing from the Mohammedan to the Christian religion. Those who took this step were called *Moriscos* by the Spaniards, and

features their very mixed blood, for the original inhabitants intermarried with Romans, Arabs, and Spanish.

MOOSE. The largest member of the deer family, this animal stands from 5 to 7 ft.



MOOSE CALF

Photo: Canadian Pacific Railway

high at the shoulder, and is covered with coarse brown fur. Its home is in the forests of Alaska, Canada and the border states of America. The European elk is a smaller moose, but the elk of America is of a different species (see ELK). Moose belong, with caribou and reindeer, to the flat-horned group of the deer family. See DEER.

The antlers of the male moose sometimes have a spread of 6 ft. from tip to tip. The fore part of them resembles the horns of a deer, but the branches at the back are united in a spade-like, flat surface, often over a foot wide, from which six to twelve short points protrude, like spread fingers from the palm of the hand. The female has no antlers. The upper part of the muzzle hangs three or four inches over the lower jaw, and aids the animal in browsing for its food of soft twigs and bark, moss, and the stems and leaves of water-lilies. Its front legs are longer than those

behind, giving it a clumsy gait and making it necessary for the animal to get on its knees when eating from the ground.

With all its apparent clumsiness, the moose is swift and powerful. It never gallops, but



BULL MOOSE AND MATE

Photo: P. & A.

any lapse to the old religion was punished with severity.

The present Moors are not, as is sometimes supposed, negroes. They are a white race, showing in swarthy skin and aquiline

runs with a high step. In spite of restrictions on moose-hunting in both Canada and the United States, and the establishment of game preserves, the animal is in danger of becoming extinct.

Scientific Names. Moose belong to the family *Cervidae*. The European elk is *Alces alces*. The American species is *Alces americana*.

MORAINE, *mo rayn'*. A glacier in a mountain valley bears on each side a line of rock fragments that have rolled or slid on to the ice from the adjoining slopes. This is called a *lateral moraine*. Where two mountain glaciers unite, the lateral moraines on their adjacent sides merge into a *medial moraine* along the middle of the united stream. At the lower end of a mountain glacier, or at the front of a continental ice sheet, a much larger ridge is built up of material deposited as the ice melts. Such a ridge, which has a characteristic topography of knolls and hollows, is a *terminal moraine*. Some of the terminal moraines formed by the great ice sheets of the Pleistocene Epoch are ranges of hills. Finally, the material in the bottom of the glacier, deposited beneath the ice as it melts, is the *ground moraine*. See GLACIER.

MORALITY PLAY. A drama in which the characters personify abstract ideas, such as virtue, vice, wealth, poverty, knowledge, ignorance, innocence, jealousy, etc. These plays were first produced in England in the fifteenth century, and with the *miracle* and *mystery* plays, all growing out of Church pageants, gave rise to modern drama. The morality play marks the third stage in the development of the drama, the mystery and miracle plays coming first.

The morality plays were intended to teach moral reform, but as they developed, the "vices" began to furnish the humorous element. The clowns and fools superbly created by Shakespeare were a development of the "vices" of the morality play. See DRAMA.

MORATORIUM. A postponement, by executive or legislative decree, of the time for payment of financial obligations. A moratorium is usually occasioned by a monetary panic, political or industrial upheaval, or national calamity, such as a flood or earthquake. Its effect is to stay legal action for the collection of debts, but it does not release the debtor from his obligations. With the great extension of international commerce and the credit system, a moratorium has come to relate largely to bills of exchange, drafts and bank deposits, and excludes from its operations household and personal obligations.

Prior to the World War, moratoria were used only on occasions of public disaster, such as the Paris floods of 1910, or the Messina earthquake. The first war moratorium was decreed by Great Britain in August, 1914, owing to the cessation of remittances from abroad to meet bills of exchange in London.

In the world financial crisis of 1931 and in the succeeding years, a moratorium was frequently decreed. In 1931 a one-year moratorium on inter-governmental debts was declared by President Hoover of the United States, whose suggestion of a postponement for one year of all inter-governmental obligations arising out of the war, reparations and relief debts, both principal and interest, was adopted by the nations. Certain "stand still" arrangements were agreed upon at the same time, relieving German private creditors from the immediate necessity of meeting their foreign obligations. Germany also adopted, later, the "transfer moratorium," which did not mean the cessation of payment in marks of principal and interest, but of payments in foreign currency.

Early in 1933, heavy withdrawals of bank deposits caused many States in the United States of America to order a bank moratorium. In March of that year, President Roosevelt issued a proclamation declaring a nation-wide bank holiday by suspending all banking operations in the United States and its territories. This was done to prevent the export, hoarding or earmarking of gold or silver, coin, or bullion, or currency, and to protect bank deposits, until measures could be taken to restore confidence.

MORAVIA. Formerly a Crown land of Austria-Hungary, Moravia is now a province of the Republic of Czechoslovakia. It has an area of 8616 sq. miles in the central part of the Republic. The land is the eastern part of the Bohemian plateau, surrounded by hills and mountains and drained by the River Morava, a tributary of the Danube. Two-thirds of the population is Czech, and nearly one-fourth German. Wheat, oats, rye, barley, maize and flax are cultivated, and great quantities of sugar-beet are grown. Leather goods, yarn, silk, wine, glass and machinery are also manufactured.

The greater part of the inhabitants are Roman Catholics. The largest city and the centre of the woollen industry is Brno, which has a population of about 263,600 (see CZECHOSLOVAKIA). The population of the province is about 3,500,000.

History. The earliest records show that Moravia was occupied by the Boii, a Celtic race after whom Bohemia is named. They were succeeded by the Germanic Quadi, who

accompanied the Vandals in their western migration. Other German tribes followed them, but by the sixth century there was an overwhelming invasion of Slavs.

In 789 Charlemagne brought the country under his rule. After his death in 814, the Moravian princes attempted to assert their independence, and their leader Rastislav even formed an alliance with the Bulgarians and the Byzantine Emperor. As a result of these foreign contacts, Christianity was formally established in the kingdom in 864, following the labours of missionaries from the Greek Church at Constantinople. Svato-

from persecution and exile that the sect almost died out.

In the eighteenth century the Brethren experienced a revival of strength in Germany, and later a number of members emigrated to America, where they founded churches. They are now strongest in America, and are zealous in missionary work.

MORAY, JAMES STEWART, EARL OF (1551-70). Regent of Scotland; a natural son of King James V and a half-brother of Mary Queen of Scots. In 1555 he accepted the Calvinistic teachings of John Knox, and became the leader of the Lords of the Con-



BRNO, MORAVIA

Photo: Czechoslovak Travel Bureau

pluk, the successor of Rastislav, extended Moravia's boundaries.

Further expansion was thwarted by the Magyars, and, indeed, the kingdom decreased until the territory was reduced to its present size. During most of the tenth century, Hungary, Poland and Bohemia quarrelled over the possession of Moravia, but in 1029 it was finally incorporated with Bohemia and became a part of the medieval German Empire. After the Battle of Mohács in 1526, Moravia fell to Ferdinand of Austria. In 1849 it was separated from Bohemia and made a distinct province, or independent crownland.

MORAVIAN BRETHREN. A Protestant sect which originated in Moravia and Bohemia after the death of John Huss. The Brethren numbered at least 200,000 by 1617, but during and after the Thirty Years War, which ended in 1648, they suffered so much

gregation who engaged themselves to extirpate idolatry and the Roman Catholic faith from Scotland. On the death of Mary of Guise, Queen-mother and regent, James brought the Queen back from France and became her chief secretary, being at the same time created Earl of Moray (or Murray). He strongly objected to the marriage of Mary with Darnley, but, without carrying his opposition to the point of armed resistance, he fled to the court of Elizabeth. After the murder of Rizzio he returned and was reconciled. On Mary's abdication in 1567 he became regent for the infant King, James VI. At the investigation into Mary's part in the Darnley murder, he produced the Casket Letters, though reluctantly, for fear of endangering his own safety should Mary be restored. In 1570 Moray was assassinated by James Hamilton, one of the few adherents of Mary in Scotland.

MORAYSHIRE, OR ELGINSHIRE. A north-easterly maritime county of Scotland, with an area of 304,606 acres and a population (1931) of 40,805.

Moray falls into two natural divisions, the highland region of the south and the lowland region of the north, with an intermediate upland country. In the extreme east the landscape is dominated by the valley of the Spey. The Grampians form a natural bulwark to the highland region, which is a country of heather moors and rocky hills cut by numerous glens, of which the majority lie in a north-south direction between descending parallel ridges. The

History and Antiquities. There is ample evidence of a prehistoric civilization in the hill districts and in the lowlands alike, and numerous flints have been discovered in the Culbin sands. Large numbers of stone circles, of which the finest is at Urquhart, demonstrate that the area was thickly populated. With regard to the Roman occupation nothing is definitely known. The Roman bath at Burghead is not conclusive evidence of Roman occupation. Burghead, also, is the traditional site of the first Christian church established here at the beginning of the seventh century or earlier, under the auspices of the Irish Saint Columba.



RUINS OF ELGIN CATHEDRAL

The great church, 290 ft. in length, was founded in 1224. Destroyed in 1390, it was rebuilt as the finest church in Scotland. In 1506 and again in 1711 the central tower collapsed, and the building, which had suffered during the Reformation, was finally allowed to go to ruin.

Photo: Scottish Travel Association

highest point reached is on the borders of Banffshire, 2316 ft., but several square miles of the central uplands have a mean elevation of more than 1500 ft.

By contrast, the northern plain ranges from sea level to a height of 500 ft., and in width varies from three to eight miles. This, the "Laigh of Moray," is one of the most fertile districts in all Scotland. The great forest of Darnaway and the Altyre Woods are the most richly timbered areas. The coast is level and generally sandy; the Culbin sandhills, westward of the Bay of Findhorn, have extended over land formerly fertile.

The principal river is the Spey, which rises in Inverness-shire and flows north-east through Moray, forming for a part of its course the boundary line between Moray and Banff. The Findhorn, which enters the county from Nairn and flows through Forres into Findhorn Bay, drains most of the west, whilst the Lossie rises in the central uplands. See NAIRNSHIRE.

After the unification of the kingdoms of the Scots and Picts in the ninth century, the whole district came under the sway of the chieftain MacAlpin. Later, the county suffered through the Scandinavian invasions. At this time the province of Moray emerged, including the whole of Nairn as well as part of Inverness. Its own earls ruled with practically autonomous power. The battle of 1040 between the Scandinavians and Macbeth, and the subsequent revolt of Macbeth against King Duncan were events of historic importance. The first Scottish king who undermined the power of the earls was David I. Robert the Bruce and William Wallace both found ardent support in this province, and from 1296 to 1303 Moray's claim to independence was successful. Again, after the Battle of Bannockburn, the Earldom of Moray conferred exceptional powers on its holder.

Apart from the prehistoric antiquities mentioned above, Sweno's stone at Forres

takes pride of place. This is very elaborately decorated, and is one of the most perfectly preserved of the sculptured stones in Scotland. Architecturally, Elgin Cathedral is the most striking of the extant ruins. A mixture of Norman and Gothic, it is without peer. The ruins of Kinloss Abbey and Pluscarden Priory both date from the thirteenth century.

Agriculture and Industries. Agriculture is the principal occupation, the Laigh of Moray being chiefly arable and the remainder of the county pastoral, with the exception of permanent grass and root-crops. Cattle and sheep are reared in all districts. Deep-sea fishing in the Moray Firth has decreased, partly owing to severe competition from the steam drifters of Aberdeen. Distilling and quarrying are also carried on profitably. Lossiemouth is the most important seaport, though even here trade has dwindled.

Chief Towns. The county town is Elgin (which see). There are five other Burghs: Burghead (population in 1931, 1255), Forres (population in 1931, 4169), Grantown-on-Spey (population in 1931, 1577), Lossiemouth (population in 1931, 3914), and Rothes (population in 1931, 1292). Of these, Forres and Lossiemouth, in addition to being towns of great antiquity, have recently acquired a wide popularity as summer resorts.

MORDANTS. Substances capable of uniting chemically with dyestuffs to produce insoluble compounds that will give permanent colours. The mordants in common use include salts of chromium, iron, aluminium, tin or other metals, and tannic acid, lactic acid, oleic acid, and so on. The former are basic, or metallic, mordants, and are used with acid dyestuffs; the latter are acid mordants, and are combined with basic dyestuffs. The compounds of basic mordants with dyestuffs are called *lakes*. See DYEING AND DYE STUFFS.

MORDECAI, *mor' deki*, or *mor de kay'*. See HAMAN.

MORE, SIR THOMAS (1480-1535). Lord Chancellor of England; he was born in London "of a family not illustrious but honourable," as he himself described it. Archbishop Morton, in whose household he served as a youth, sent him to Oxford, where for two years he studied Greek under Grocyn and Linacre. Returning to London, More took up the study of law at New Inn and later at Lincoln's Inn. For a time he lectured on law and served as a member of Parliament. He became bencher of Lincoln's Inn in 1509, and was a member of the Commission which negotiated a commercial treaty with Flanders (1515). At the court of Henry VIII, More became a prominent and influential figure, and among the many important offices which he

held was that of Speaker of the House of Commons. On the downfall of Wolsey in 1529, Henry made More Lord Chancellor, but three years later, declining to support the King's anti-Papal policy, he resigned and went into retirement. In 1534 he was committed to the Tower for his refusal to subscribe to the Oath of Supremacy. In the following year he was charged with high treason, convicted and executed.

More was a man of great learning and at the same time of extraordinary charm and probity of character. Among his writings in Latin and English, remarkable for their prose style, are the *Utopia* and the *History of Richard III*. He is reckoned among the greatest of English humanists. His domestic life was exemplary and the family circle at Chelsea was cultured and happy. In particular, the affection which existed between More and his daughter, Margaret Roper, and his long friendship with Erasmus are noteworthy. "Nature," said Erasmus, "never formed a sunnier and happier disposition than that of Thomas More." He was canonized a saint by the Roman Catholic Church in 1935.

MOREA, *mo re' a*. See PELOPONNESUS.

MORGAN, SIR HENRY (1635-1688). A notorious buccaner of the seventeenth century. His attack on Panama was made after peace had been arranged between England and Spain, and Morgan was sent to England as a prisoner. But the riches which he carried with him gained for him the honour of knighthood from the hands of Charles II. In 1674 he was sent back to Jamaica as Lieutenant-Governor and Commander-in-Chief of His Majesty's Forces in the colony.

MORISCOS, *mo ris' kôs*. A name once applied to some of the Moors of Spain who, after the overthrow of their Empire, became Christians. See MOORS.

MORLAND, GEORGE (1763-1804). English painter of common rural scenes, whose numerous works gained him a wide reputation in his own day. He was born in London, and inherited artistic gifts from his father and grandfather. He exhibited at the Royal Academy at the age of ten. When freed from the narrow restraints of



GEORGE MORLAND
(National Portrait Gallery)

his home, his habits became loose and dissipated. He refused an offer from Romney to become his assistant and preferred a hand-to-mouth existence. Many of his four thousand pictures were painted to raise money to pay his debts. Morland's paintings, the best known of which are "The Interior of a Stable" and "The Alehouse Door" (both in the National Gallery), show him to have been a master of genre painting; his animal studies are unsurpassed, unless by Landseer.

MORLEY, JOHN, FIRST VISCOUNT MORLEY OF BLACKBURN (1838-1923). An English



LORD MORLEY
Photo. Brown Bros.

author and statesman. After leaving Oxford in 1859, Morley began a distinguished career in London as writer and editor, but his interest in the Liberal party led him into politics. He was elected to Parliament in 1883, and in 1886 became Chief Secretary for Ireland in Gladstone's third Cabinet, where he favoured the grant of Home Rule.

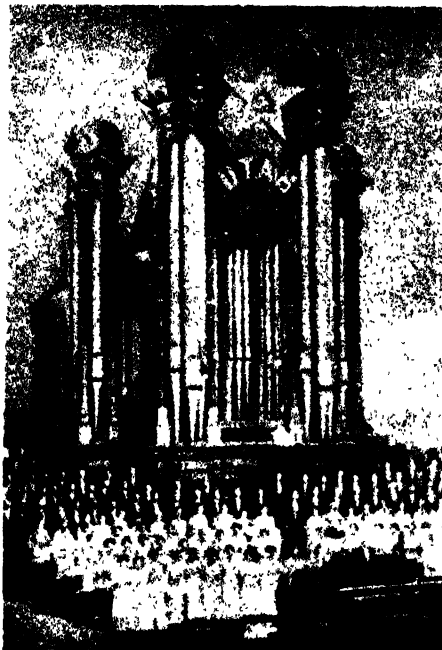
Morley's subsequent career was one of consistent opposition to imperialism and the use of military methods in extending the Empire. He opposed the Boer War, and as Secretary of State for India (1905-1910) under Campbell-Bannerman and Asquith, he showed his sympathy with the aspirations of the native people for a measure of home rule, though he repressed outbreaks of sedition with firmness. In 1914, when Great Britain entered the World War, he resigned from the Government owing to his opposition to war.

His writings, of outstanding merit, include the *Life of Edmund Burke*; *Life of Cobden*; *Voltaire*; *Rousseau*; *Diderot* and the *Encyclopaedists*; *Oliver Cromwell*; and *Life of Gladstone*. His *Life of Burke* appears in the *English Men of Letters* series, of which he was chief editor.

MORLEY, THOMAS (c. 1557-1604). English composer and writer on music. His canzonets, madrigals, and two-part fantasies are written in a very pure style of counterpoint, of which he was a past-master; and are of great charm. His book on music of the contrapuntal style, *A Plaine and Easie Introduction to Practicall Musicke* (1597), is one of the most important works on the subject, and the first of its kind to be published in England.

MORMONS. Officially called THE CHURCH OF JESUS CHRIST OF LATTER DAY SAINTS. A religious sect founded by Joseph Smith in 1830, and now numbering over 655,000 adherents in various parts of the world.

In their view, the Bible is accepted as inspired, but is supplemented by the Book of Mormon, and by revelation through the President of the Church. The salvation of man is possible, according to Mormon doctrine, only through belief in Christ's atone-



INTERIOR OF MORMON TABERNACLE
The choir and great organ at Salt Lake City.
Photo Visual Education Service

ment, repentance for sin, and baptism for the remission of sin.

The Mormon beliefs in regard to marriage have been more widely discussed than any other feature of their creed. Joseph Smith declared that he had received a divine command to re-establish plural marriage, and polygamy, though not obligatory, became the practice of the Elders and of many of the people. This brought the sect into conflict with the law of the United States, and after a long and embittered controversy the Mormon leader, Woodruff, in 1890 issued a manifesto withdrawing the sanction of the Mormon Church from polygamous unions.

The ruling President is the successor of Joseph Smith. Associated with him are two counsellors. These three, who are

declared to be the successors of Peter, James and John, constitute the *first presidency*. Next rank the patriarch, whose function it is to bless and lay on hands, and the twelve apostles, who are a high council of the Church. The Church is divided into about fifty *stakes*, nearly half of which are in Utah.

The Mormon revelation is said to have been made to Joseph Smith by an angel, at whose direction Smith claimed to have found the Book, written on gold plates in strange characters, buried in a hill in New York State.

The Book of Mormon purports to be a record of two early races of America, the Jaredites, who came from the Tower of Babel, and the Nephites, who are said to have arrived from Jerusalem about 600 B.C.

Joseph Smith and others, who had become his adherents, organized the Church at Fayette, Seneca County, New York State, on 6th April, 1830. A period of persecution now followed in various places where Mormons had attempted to settle, and these came to a climax in 1838 at the settlement in Far West (Missouri), where a number of Mormons were killed in a riot, and Smith and other leaders were imprisoned. Thereupon most of the Mormons, about 15,000 in number, migrated into Illinois, where they founded the town of Nauvoo. Here Smith, who had been released from prison, rejoined his followers. Further trouble arose, however, and Joseph and his brother Hyrum were arrested in 1844, and imprisoned in Carthage jail, where they were shot by an invading mob.

The death of Smith caused consternation and confusion in the Church, but the great body of members accepted the leadership of the twelve apostles, with Brigham Young at their head as Joseph Smith's successor. Led by him, they began their westward migration in 1846, and the next year settled on the shores of Great Salt Lake.

For a number of years there was conflict between the United States Government and the Mormons. The latter applied for admission to the Union in 1849 as the "State of Deseret," but met with refusal. Utah, however, was organized as a territory in 1850, and Brigham Young was Governor for seven years. He proved an able leader. In 1896 Utah was admitted into the Union of States.

See UTAH.

MORNING-GLORY. The common name of a family of climbing plants which botanists call *Convolvulaceae* (*Convolvulus*). The

garden morning-glory, the best-known ornamental plant of the group, has velvety, funnel-shaped flowers of variegated hues—shades of purple, blue, pink and white. The vine has a dark-green, heart-shaped leaf, and grows at an astonishingly rapid rate, twining itself about anything near it. See *CONVOLVULUS*.

MORNING STAR. See *EVENING STAR*.

MOROCCO. A country occupying the north-west extremity of Africa. It comprises approximately 213,350 sq. miles, of which Spain controls 13,125. A strip along the Mediterranean is known as the Spanish zone; the remainder, excepting Tangier, is a French



MOROCCO
Tombs of the Sultans at Fez.
Photo: U. & U.

Protectorate, though nominally all of Morocco is an Empire, governed by a Sultan. The population of the French zone is about 4,500,000; the Spanish zone has about 1,000,000 inhabitants. Tangier city, with surrounding territory (225 sq. miles), is internationalized. The country is crossed in the north and the south by the two ranges of the Atlas, of which the southern is still imperfectly explored. Between them a wide plain opens to the Atlantic. The climate is warm, with dry summers and moist winters. Of the total population of Morocco, about 136,000 are Jews and about 200,000 Europeans.

The People and their Surroundings. There is almost no settled industry, though cattle, hides, wool, barley, wheat, eggs, almonds, flax-seed, beans and some other products are exported. While much of the land is unsuited to cultivation, there are vast areas on the tablelands between the Atlas Mountains and the sea that would be very productive if properly tilled. Phosphates, lead ore and manganese are mined, and there is much other mineral wealth. The Berbers constitute the most numerous part of the population,

and are to be found chiefly in the mountains. The plains are inhabited by the Arabs and the Moors, a people of mixed Berber and Arab blood and of Arabic culture.

Government. Until recently, Morocco was in every sense an absolute monarchy, or despotism. The Sultan was the chief of the State and the head of the religion, which is Mohammedan. France, hoping to include Morocco within her vast African Empire, established a protectorate over most of the

were drawn for service there. When the Moors were finally driven from Spain after the fall of Granada in 1492, many of them settled in Morocco. The first foreign ambassador appointed to Morocco was sent by Queen Elizabeth of England in 1577. Henry III of France also sent a consul to Morocco and Fez in the same year. In 1814 the slavery of Christians was abolished, and piracy was prohibited three years later. However, friction between groups of natives



The seat of the French Government in Morocco.

Photo: U. & U.

country, and induced the Sultan to countenance certain reforms. Spain for a time opposed French domination, and the arrival of the German gunboat *Panther* off Agadir in 1911 nearly brought about an international crisis. Germany later abandoned her claims in return for the cession of a part of French Congo, and Spain was given a protectorate over the Mediterranean coast. The French in their zone control the official acts of the Sultan through their Resident-General, whose headquarters are at Rabat.

History. Morocco in ancient times formed part of the Roman province of Mauritania, and when Rome's power declined, it experienced the vicissitudes of the other African provinces. It was overrun by the Arabs in 682, reduced to submission, and forced to adopt the Mohammedan religion. It participated in the conquest of Spain, and it was largely from Morocco that fresh contingents

and Europeans has continued to the present day. In 1859 a war with Spain broke out after which Morocco was forced to pay an indemnity of £4,000,000. In 1923 a series of conferences over controversies affecting control of Tangier resulted in the formation of an international zone round the city. The agreement was signed by Great Britain, France and Spain, and became effective 1st June, 1925. Italy did not recognize the new order until a new Tangier accord, in 1928, gave Italy a share in the policing of the zone. Sultan Sidi Mohammed was proclaimed in 1927. For several years, beginning 1922, there was warfare with the Riffian tribesmen which taxed the resources of both Spain and France. The Riffian leader, Abd el-Krim, finally surrendered, and was banished to Réunion Island (1926). Spanish Morocco was one of the chief centres of the military and anti-Socialist revolt beginning in July, 1936.

Towns. The chief of these are as follows—

Casablanca, or *Dar-el-Beida*, founded in 1468, and the country's largest seaport, is on the Atlantic coast. It handles half the foreign trade. The population is 161,113 (1931), of whom about 45,000 are Europeans and about 18,000 are Jews.

Fez, founded probably in A.D. 808, and one of the Sultan's capitals, is situated in a deep valley 100 miles east of the Atlantic Ocean. It is divided into old and new Fez by the river of the same name. The streets are narrow and dirty.

Fez conducts an extensive trade by caravan with the interior, and is noted for its manufactures of woollen cloaks, silk shawls and handkerchiefs, the red caps called *fez* (named after the town), firearms, swords and leather goods. A railway line runs westward from Tunis through Fez to the Atlantic and thence south to the city of Marrakech. Population, 107,843 (1931); 5000 are Europeans and 10,000 are Jews.

Marrakech, formerly called Morocco, is one of the four capitals of the Sultan, and is situated on a plain about 1500 ft. above sea-level, 90 miles from the Atlantic. A crumbling wall $7\frac{1}{2}$ miles in length encloses a tangle of narrow, crooked streets, and though there are numerous gardens, open spaces and market places, the general aspect is one of neglect.

The manufacture of so-called Morocco leather is the only industry of note. Of the population, which is 193,582 (1931), many are Jews. There are not more than 3000 European residents. Marrakech was founded in the eleventh century, reaching the height of its prosperity about 1400. It then had a population of about 700,000.

Meknès, least important of the Sultan's capitals, now his summer residence, is situated a little east of Fez. It has a pottery industry. Population 54,156 (1931).

RABAT, on the Atlantic coast, founded in 1184 on the ruins of an ancient Roman colony, is one of the Sultan's capitals and the headquarters of French control in Morocco. It manufactures leather, carpets and rugs. Population 53,006 (1931), of whom one-third are Europeans.

The capital of the Spanish zone is *TETUAN* (population, 48,000), and of the international zone *TANGIER* (which see).

MOROCCO. A variety of dressed leather, made from the skins of goats and manufactured originally by the Moors in Southern Spain and Morocco, whence its name. The characteristic qualities of genuine morocco are its elasticity, softness, and fineness of grain and texture. It is extremely ornamental and is used for expensive book-bindings.

MORONS. See **MENTAL DEFECT**.

MORPHEUS, *mor'fe us*. In classic mythology, the name bestowed upon a minister of Somnus, the god of sleep (see **SOMNUS**). He it was that called up visions in sleep, i.e. dreams.

MORPHINE, *mor'fin*, or *mor'feen*. The principal alkaloid in opium, of which it forms about 10 per cent. Crude morphine is greyish-brown, but the commercial product, obtained by dissolving the alkaloid in dilute sulphuric acid and treating it with bleaching agents, occurs as white, feathery crystals. Morphine relieves acute pain by producing sleep, when sufficiently large doses are given. Small doses allay pain without causing sleep. Since morphine is one of the most dangerous of habit-forming drugs, physicians advise against its use except in cases where pain is severe. It is sometimes given to cure diarrhoea, to allay persistent cough, and for the relief of asthma. The tendency, however, is to use a substitute for this drug whenever possible.

Overdoses of morphine cause death by slowing up respiratory action to the point of failure. Prompt measures may save the victim. These measures include washing out of the stomach and the administration of potassium permanganate. See **OPIUM**.

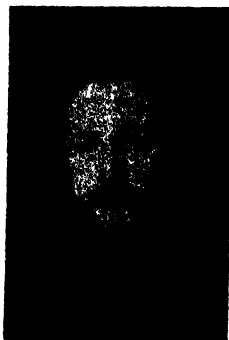
MORPHOLOGY, *mor fol' o je*. The branch of biological science which deals with the form and structure of animals and plants. It investigates the development of animal and plant forms rather than their uses, studies the life history of the organism as a whole and also of its separate organs, and traces the resemblances and differences between different forms. In the study of botany, morphology is sometimes spoken of as *structural botany*. See **BIOLOGY**; **BOTANY**; **ZOOLOGY**.

Derivation. The term was first employed by Goethe, and is from the Greek *morphe*, "form," and *logos*, "doctrine."

MORRIS, WILLIAM (1834-1896). English poet, artist and socialist, born at Walthamstow. He was a most precocious child, reading the Waverley novels at the age of four; yet he was fond of out-of-door life. At Marlborough School he failed to distinguish himself, but at Oxford he exerted a real influence in his little circle. One of his closest friendships, formed in college, was with Edward Burne-Jones, the painter. Morris contributed to the *Oxford and Cambridge Magazine*, which was issued for a year at his expense; and in 1858 produced *The Defence of Guenevere, and Other Poems*, a work possessing the very spirit of medieval romanticism. It was followed by *The Life and Death of Jason* (1867) and *The Earthly Paradise* (1868-1870). His prose romances

include *The House of the Wolfings*, *The Roots of the Mountains*, *The Wood Beyond the World*, and *The Story of the Glittering Plain*.

Although he had intended entering the Church, Morris decided upon architecture as a profession; with Burne-Jones and Rossetti, he exercised his talents at painting,



WILLIAM MORRIS
(National Portrait Gallery)

and finally found his real interest in the subject of house decoration. In 1861 he helped to found a company for the manufacture of artistic furniture and decorative articles; and he also helped to develop the art of printing and bookbinding. In 1890 he founded the Kelmscott Press, for which he himself designed the type. In the

meantime, he continued writing poetry, chiefly on subjects from ancient and medieval history.

From 1885 until his death he was a strong advocate of socialism, on the principles of which he wrote and lectured. Among the numerous books and tracts which he wrote to further his socialist ideals, the best known are his *Dream of John Ball* (1888) and *News from Nowhere* (1891). His statement, "I would have nothing in my home that I do not know to be useful or believe to be beautiful," expresses his doctrine of house decoration.

MORRIS DANCE. See FOLK-DANCE.

MORRISON, HERBERT STANLEY (b. 1888). Educated at the elementary schools, he began work as an errand boy. From 1923 to 1924 and from 1929 to the 1931 Election he was Labour Member for Hackney. He was Mayor of Hackney in 1920. He is Secretary of the Labour Party and was Chairman in 1928. In the Labour Ministry of 1923-1931 he was Minister of Transport. He became Leader of the L.C.C. in 1934.

MORSE, SAMUEL FINLEY BREESE (1791-1872). The inventor of the electric telegraph, and of the Morse Code. The first message on the instrument it had taken him ten years to perfect was sent between Washington (D.C.) and Baltimore in 1844. See SIGNALS; TELEGRAPH.

His distinction as an artist was, perhaps, only a little less than that as an inventor, for he was one of the best of the earlier American portrait painters.

MORTAR. (1) A mixture of lime and sand

(or ashes), made to a paste with water, and used for binding together brickwork. (2) A type of gun. See ARTILLERY; ORDNANCE.

MORTGAGE, *mor' gayj*. An interest in property which a debtor grants to a creditor for the purpose of making the property security for the loan. The debtor (the *mortgagor*) retains possession of the property, while the creditor (the *mortgagee*) acquires the right, if the debt is not paid, to obtain the money by a sale of all or part of the mortgaged property. A mortgage is distinguished from a *pledge*, in that a pledge involves handing over the property to the creditor to be kept by him until the debt is paid (see PAWNBROKER). A mortgage of movable goods is effected by means of a *bill of sale* (which see). At one time the law of mortgages operated very harshly against debtors. The debtor was given a limited time within which to pay his debt; and if he defaulted, the mortgagee automatically became the absolute owner of the mortgaged property. To remedy this, the Court of Chancery invented the *equity of redemption*, which is the right of the mortgagor to redeem the property from the mortgagee, by paying up principal and interest in full, at any time until the mortgagee takes the appropriate steps to "enforce his security." When the security becomes enforceable, the mortgagee may either (a) sell the mortgage property, in which case, after retaining for himself the amount of the outstanding debt, he must hand over the balance to the mortgagor, or (b) he may appoint a *receiver*, who will collect the rents and profits from the property until the debt has been paid off, or (c) he can apply to the Court for a *foreclosure order nisi*. This order means that unless (*nisi*) the debtor pays off the loan within a specified time (usually six months) the order will be made *absolute*, and the mortgage property will then become the property of the mortgagee.

MORTIFICATION. See GANGRENE.

MORTIMER. See MARCH, EARLS OF.

MORTIMER'S CROSS. See ROSES, WARS OF THE.

MORTISE, *mor' tis*. A slot cut in one of two members, usually wooden, which are to be joined. The corresponding tongue which fits into the mortise is called the *tenon*, and the two terms are always used together. Mortises are of many types, according to the strength of the joint required; but the mortise should not be more than one-third the thickness of the member.

In a modern joinery works, mortising is done by a chain cutter, while a simple hand mortiser is used by the small joiner; otherwise the work must be done with mallet and mortising chisel.

MORTMAIN. In feudal times, the lord of a manor was entitled to a payment every time the land of one of his tenants changed hands, whether by sale or on the death of the tenant. If a tenant's land passed into the possession of a corporation, e.g. the Church, the lord lost his chance of obtaining these payments; for a corporation never dies. Land which passed into the hands of a corporation was therefore said to be "alienated in mortmain," "mortmain"

between Warwick and Margaret of Anjou, now persuaded Buckingham to support Henry Tudor, Earl of Richmond. He escaped when the Duke was executed and later built up a strong party for Richmond, who, as Henry VII, created him Archbishop in 1486 and Chancellor two years later. He probably had no real association with "Morton's Fork," the device by which a heavy benevolence could be exacted from a lavish man, because he must have so much



MOSAIC-COVERED WALLS AT TIMGAD, ALGERIA

There are still extensive remains at Timgad, a city built by Trajan, which show the splendour of Roman art and architecture.

Photo: Cherry Kearton

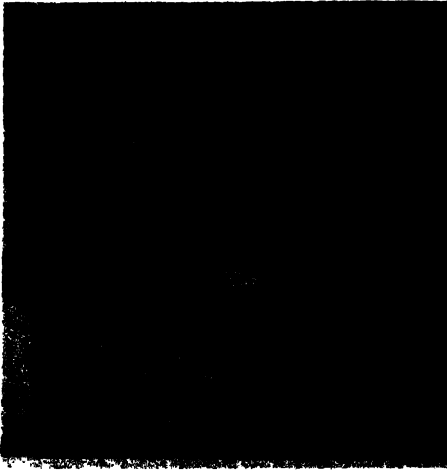
meaning "dead hand," i.e. a hand which can never alienate. For the benefit of the lords, laws were passed to restrict alienations in mortmain. These laws have now almost disappeared; but they still restrict to some extent the granting of land to be held by charitable corporations. See EDWARD I.

MORTON, JOHN, CARDINAL (1420-1500). Originally a Lancastrian supporter, Morton made submission after Tewkesbury to Edward IV, who used him on diplomatic missions and made him Bishop of Ely. Richard III never trusted him and sent him under arrest to the Duke of Buckingham. Morton, who had negotiated the alliance

to spend, and a still heavier from a miser, because he must have saved so much.

MOSAIC, *mo zay' ik*. In its commonest application, a floor or wall decoration made by fitting together in cement small pieces of hard substances, such as stone or glass. The material used and the object decorated distinguish mosaics from *inlays* of wood, ivory and the like. For floors of rooms, stone or cement shapes are commonly employed, usually in two or more colours.

Some of the finest of pictorial mosaics are to be seen in St. Paul's, London, St. Peter's, Rome, in St. Mark's, Venice, and at the Capitoline Museum in Rome. A branch of



MOSAIC FROM TIMGAD, ALGERIA

Photo: Cherry Kearton

the art, known as *Florentine mosaic*, employs stone and shells in natural colours to make such articles as jewellery and personal ornaments. The mosaics of the Albert Memorial and of Westminster Cathedral are other fine examples of modern English work.

MOSCICKI, *mos chik' e*, IGNACE. A professor of chemistry who became President of Poland; was elected 1926; re-elected in 1933.

MOSCOW, officially *Moskva*. The capital of the Union of Soviet Socialist Republics, situated on the River Moskva, 400 miles south-east of Leningrad.

The Kremlin, now used for Government purposes, is an ancient fort occupying a hill near the centre of the city. The streets of Moscow radiate from a common centre, and a tramway system links the city with the suburbs. In 1925 a motor-bus system was also put into operation, and an underground railway has been constructed.

The Cathedral of the Archangel Michael contains the tombs of all the tsars down to the time of Peter the Great, and near by is a convent dating from the close of the fourteenth century, which has served as the burial-place of wives and sisters of the tsars. Surrounded by the towers and turrets of this stately citadel is the "Tsar Kolokol," the largest bell in the world.

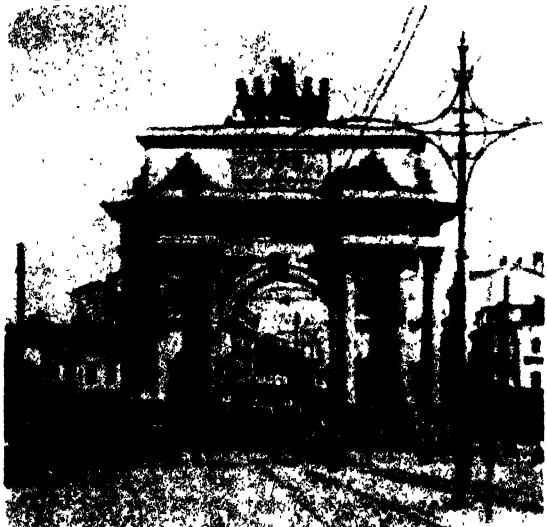
To the east of the Kremlin lies the portion of the city known as the Kitaigorod, still an important commercial district of Moscow.

About the Kremlin and the Kitaigorod lie the newer business and residential districts and, beyond these, extensive suburbs.

One of the most striking buildings in the city is the Cathedral of St. Basil, built in the sixteenth century. Worthy of note also are the palace, occupied in 1812 by Napoleon, and the former town hall. The city still retains its importance as a literary and artistic centre. It is the seat of the Moscow State University, founded in 1755, and of numerous educational and scientific institutions. It also has many notable museums and a library of about 3,000,000 volumes.

Moscow is the chief industrial city of Russia. Eleven main railway lines converge upon it from all parts of European and Asiatic Soviet republics.

The foundation of the city dates from the twelfth century. It was the centre of the Russian religious world, and by the fourteenth century was also the capital of Muscovy. It remained the capital of the Russian Empire until (St.) Petersburg (now Leningrad) was founded in 1703. In 1812 it was taken by Napoleon, but was fired by the retreating Russians to prevent him making it his winter quarters. After the Bolshevik regime began in Russia (1917), the city of Leningrad, then called Petrograd, was threatened by enemy forces, and Lenin moved the capital to Moscow. With the transfer came a great increase in population, which created a serious housing problem. The famine of 1920 and 1921 further complicated the situation, since thousands



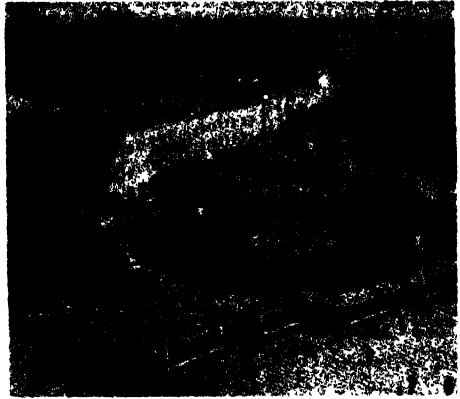
MOSCOW

The Triumphal Arch, near the Alexander Railway Station.

Photo: U. & U.



MOSCOW
St. Xavier's Church.
Photo: U. & U.



DOBRYNIN SQUARE, MOSCOW
Photo: U. & U.

flocked to the city for food. Work on a ten-year rebuilding plan was begun in 1935. The principal industries are the textile, machine-shop, food and chemical products. Population in 1926, 2,124,500; in 1933, 3,663,300.

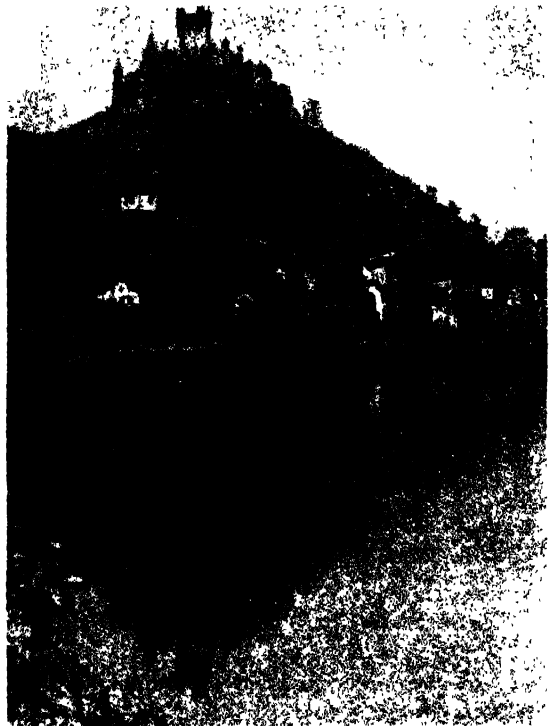
Moscow is the centre of a "government," which is the greatest manufacturing district of the Republic. Area, 12,850 sq. miles; population, about 4,900,000.

MOSELEY, H. See CHEMISTRY.

MOSELLE, *mo zel'*, RIVER. A tributary of the Rhine, which rises in the Vosges Mountains, in the extreme north-eastern part of France, and follows a winding course north and east, emptying into the Rhine at Coblenz. It is 314 miles long, and is navigable for small vessels for about 200 miles. The lower course of the river traverses a region which produces the well-known Moselle wines, and the stretch between Trèves and Coblenz is also famous for its castles and scenery.

MOSES. The great leader and lawgiver of the Hebrews at the time of the Exodus from Egypt.

The story in the Bible of this Jewish hero is woven out of the three different strands of narrative that make up the Pentateuch (see BIBLE). According to these, he was born in Egypt of the tribe of Levi at the time when, by the order of Pharaoh, the drowning of every male Hebrew child had been decreed. Concealed by his mother in a basket on the banks of the Nile, he was found by



KOCHER CASTLE ON THE MOSELLE
Photo: German State Railways

Pharaoh's daughter, and given by her to his mother to nurse. When "grown up," he was delivered to the princess and taken to

the Court to be "schooled in all the wisdom of the Egyptians." Sympathizing with his oppressed brethren, he slew a persecuting Egyptian, and fled in fear of his life to the



Mount Sinai
Photo: U. & U.

wilderness of Midian, where he found a home with Jethro the priest, one of whose daughters he married.

After forty years' life there as a shepherd, Moses received a revelation from God in the Vision of the Burning Bush at Horeb. God there revealed to him His Name "Yahweh," and appointed him to be the deliverer of his people from the Egyptian yoke.

Moses then proceeded to the Court of Pharaoh, and demanded, in the name of God, that the king should let the people go. Pharaoh, unwilling to lose the labour of his slaves, refused, and it was not until Moses had ten times brought upon him the Divine vengeance in the plagues, which culminated in the death of the first-born, man and beast, of every Egyptian, that Pharaoh was brought to consent.

The Exodus. Then it was that Moses led 600,000 men, besides women and children, into the desert. The Red Sea parted before them to save them from the pursuit of Pharaoh, who had repented of his consent, an event celebrated again and again in Hebrew poetry, and they marched to Sinai. There in Horeb, the Mount of God, Moses, going up the mountain alone, received from God, amid thunderings and lightnings, the ten Commandments of the Law. There,

also, he instituted the priesthood and made the tabernacle.

The remainder of Moses' history is concerned with the wanderings in the wilderness, caused by the obstinacy and murmurings of the Jews, who were punished with plagues, and finally condemned, as far as that generation was concerned, to die in the desert. Thirty-eight years were spent in these wanderings, during which time Moses upheld the constancy of his mission. Toward the close of the period God told him that he himself should not enter the promised land, though he should see it. Resuming his march forward, he brought the people to its verge, after various vicissitudes and battles with the Amorites and the king of Bashan. At the last he ascended Mount Nebo, "on the top of Pisgah," and died there at the age of 120 years.

Even those who do not accept the Bible narrative in its entirety agree that Moses was an historical figure, who delivered the Israelites from Egyptian bondage, and was



Michelangelo's famous sculpture in St. Peter's, Rome.

their leader during the time spent in their journey to Canaan; that he welded the tribes into a homogeneous body and gave them the inspiration of a national religion;

and that he drew up laws and customs, which prepared them for their future existence as a nation. The debt which Israel felt that it owed to this great man is exemplified by the veneration paid to his name in future ages, and the attribution to him of much that really belongs to later leaders.

He seems to have been impulsive and of a quick temper, as is shown in the incidents of the slaying of the Egyptian, and the breaking of the tables of the Law through his indignation at the outbreak of idolatry at Sinai in the worship of the Golden Calf. His humility and willingness to efface himself are plainly to be seen in the reluctance with which he undertook his mission, and later in his request to God to blot him out of His book rather than undo the work of deliverance for the murmuring Israelites. A natural bent toward compassion was combined in him with the force of character befitting a born leader of men. But that which chiefly marks his greatness, is the extraordinary fortitude, patience, skill and tenacity with which he nursed the task entrusted to him, of bringing a mixed and uncohesive multitude out of slavery, and welding them into the nucleus of a great people, whose ancestors they were destined to be.

MOSLEMS. See MOHAMMEDANISM.

MOSLEY, OSWALD ERNALD, sixth Baronet (born 1896). Sir Oswald, on passing out of Sandhurst, was granted a commission in the 16th Lancers, with whom he served in France during the World War before he was transferred to the Royal Flying Corps. He was returned for Harrow as a Coalition Unionist in 1918, but in 1922 he declared himself an Independent. In 1924 he joined the Labour Party, sitting for Smethwick from 1926 to 1931 and being appointed Chancellor of the Duchy of Lancaster in the Ministry of 1929. In 1930 he founded a Fascist party in this country. At political meetings his followers have frequently clashed with the more extreme partisans of the Left, charges and counter-charges have been made of violence and hooliganism, and police have often been forced to intervene. In 1920 Sir Oswald married Lady Cynthia Curzon, a woman of great character and charm, who died in 1933.

MOSQUE, *mosk*. A place for prayer and worship among Mohammedans. The first mosques were built with an open, rectangular court surrounded by colonnades. In the centre of the court was a fountain for washing, a part of the religious service. All Mohammedans turn toward Mecca when they pray, and that they may know the right direction, one of the walls surrounding the court was built at right angles to the

direction of the building from Mecca, and in this wall was placed the so-called *Mecca niche*.

Besides the niche in the wall, the mosque has the pulpit and platform from which the Koran is read. In the eighth century, the minaret, or prayer tower, was added, from which the muezzin calls the people to prayer (see MINARET). Later, mosques were covered by roof and dome. The mosque at Cordova, Spain, is one of the most famous. The largest building used by Mohammedans as a mosque is that at Constantinople, built originally for Christian worship. Now called *Mehmedie Mosque*, it is best known as St. Sophia's. See also MOHAMMEDAN ARCHITECTURE.

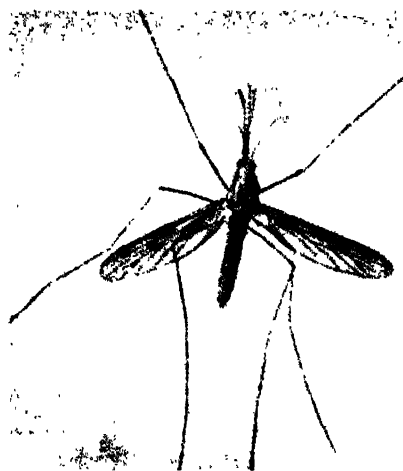
MOSQUITOES. Insects found throughout tropical and temperate regions, and as far north as Alaska, Lapland and Greenland.

In England and some other countries the mosquito is known as a *gnat*. The name mosquito is Spanish term for "a little fly."

The female lays her eggs in any still and stagnant water. She arranges them in masses to form a floating raft.

Larval Stage. In a day or two the larvae hatch. They are long squirming things familiarly called wrigglers, and may be seen in any stagnant pool or water-butt during the summer months.

Near the tail there is a long tube. This is the breathing apparatus. The larva has a



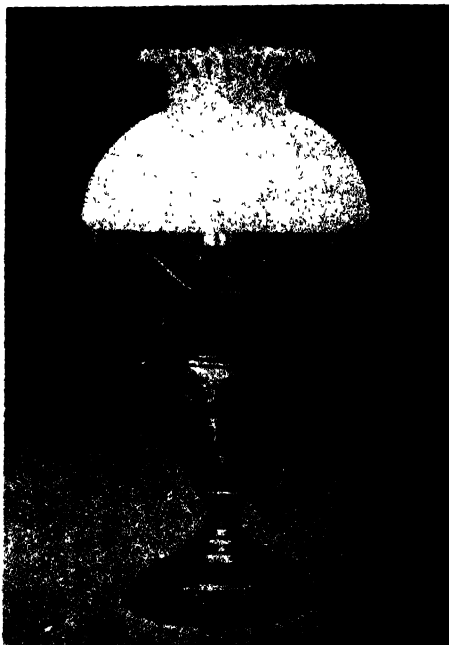
MOSQUITO
Female *Anopheles maculipennis* (native to Britain).

Photo: Photopress

pair of fine brushes on its head, which act like brooms, sweeping toward the mouth tiny food particles in the water. Every now

and again the larva wriggles to the surface and remains there suspended upside down with the opening of the tube just breaking the surface film. It is a knowledge of this characteristic method of breathing which has led to one of the most effective methods of control, namely, of spreading oil on the surface of the water. This breaks the surface film and makes it impossible for the larva to breathe. Much of our knowledge of the

brief summer season, and in temperate and tropical climates. The *Culex* mosquitoes multiply rapidly. It is possible to keep these mosquitoes away by smearing the hands and face with oil of citronella or crude cod-liver



MOSQUITOES ON LAMP
Photo: Cherry Kearton

habits of the mosquito is due to the research of Sir Ronald Ross in 1897-8.

Pupal Stage. This is reached when the larva is about $\frac{1}{2}$ inch long. The pupa has an over-large head and two breathing tubes, like small horns, which now project from the thorax; and it no longer feeds, but spends the time at the surface suspended by the breathing tubes.

The Adult Mosquito, or Imago. In a short time, generally after two or three days more, the skin cracks along the back, and the full-grown mosquito comes forth; it uses its cast-off skin for support while it dries itself in the sun. The adult life is generally from one to two weeks in length.

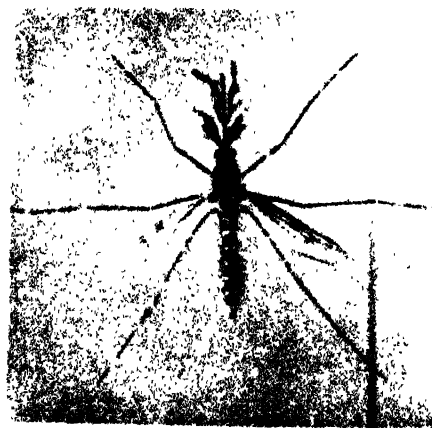
The common mosquito belongs to the genus *Culex* (the Latin for "gnat"). This mosquito is equally at home in mountainous lands and in low-lying sea-coast regions, in Arctic countries during their



MOSQUITO
Female *Ochlerotatus detritus* (British).
Photo: Photopress

oil. Soap or weak ammonia water will soothe the bites.

It is only since about 1898 that it has been conclusively proved that the tropical mos-

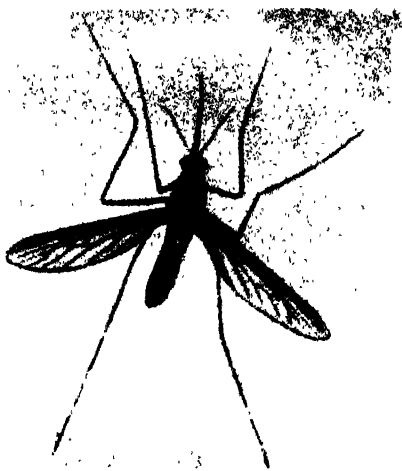


MOSQUITO
Male *Theobaldia* (British).
Photo: Photopress

quito with spotted wings, called *Anopheles*, spread malarial and other fevers.

The Malarial Mosquito. The Romans gave the name *malaria* ("bad air") to the fever because they believed it was caused by

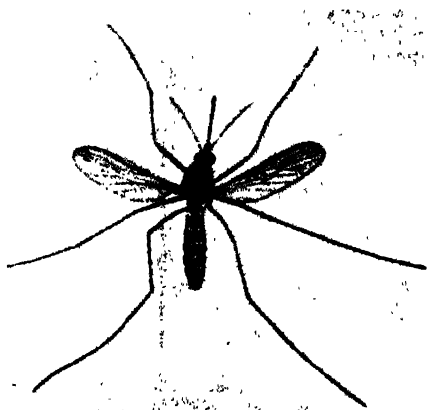
vapours from the marshes (since drained) that composed the great plain round Rome, the Campagna; but the marshes were



MOSQUITO
Female *Theobaldia annulata* (British).
Photo: Photopress

malarial merely because they offered a favourable breeding place for mosquitoes.

Through experiment it was learned that when a mosquito has sucked into his mouth the blood of a person suffering from malaria,



MOSQUITO
Female *Culex pipiens* (British).
Photo: Photopress

the saliva which it injects into the next person bitten will pass on the tiny parasite (*Plasmodium vivax*) which is the germ of malaria.

The way to distinguish the malarial mosquito from other members of the mosquito

family is by the fact that when at rest the former elevates the hind part of the body, whereas the latter holds it horizontal.

MOSS CAMPION, OR STEMLESS CAMPION. A wild flower, the stalks of which are only two or three inches high. It is found on the summits of British mountains, and in especial abundance on Scottish mountains. The plant forms a dense matted tuft, throwing up solitary bright-purple flowers, varying sometimes to white. It flowers freely in June and July. The petals are crowded, slightly notched, and the stems are much-branched and tufted; the leaves are narrow and fringed at the base. It is a perennial.

Scientific Name. *Silene acaulis*.

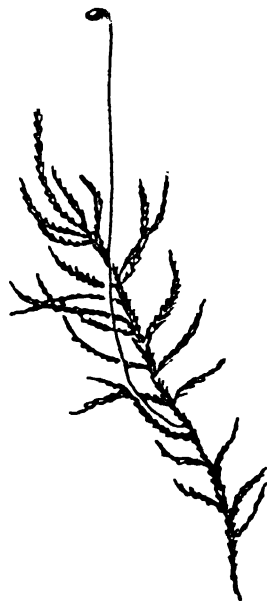
MOSSES. Green plants belonging to the flowerless group of plants, and grouped in the division known as *bryophytes*. The mosses have tiny stems and true leaves, and their spore-bearing cups usually open by means of a tiny lid. In the hot sun, some mosses curl their leaves to protect the upper surface from the drying heat; it seems they have withered and died, but showers bring back their fresh greenness.

Mosses are soil-makers. Their small roots break off tiny bits of rock, and in time make dust of stone, as if it had been pounded with a hammer. The leaves gather dust particles from the air, and these, with the dead tissue of the plant, make the soil deeper where the moss grows. In Ireland the great peat beds have been built up by layer upon layer of peat moss over many centuries (see PEAT). Mosses live generally in damp and shady places.

Classification. The mosses constitute the class *Musci*, one of the two main subdivisions of the *Bryophytes*. So-called Irish moss is a seaweed; Iceland moss is a lichen.

MOSUL, *mo soo'*. See IRAQ.

MOTE OR MOOT. This Anglo-Saxon word means a meeting or council. In primitive times the free men of the community used



HYPNUM FILICIUM



ENGLISH MOSSES

ANDREAEEA FALCATA

THUIDIUM BLANDOVII

to gather in the mote to decide all questions which affected community life and to administer justice. The shire-mote and hundred-mote thus developed into law courts. The supreme council of the realm was the Witenagemot, (which see).

MOTET. One of the main forms of music throughout the fifteenth, sixteenth and seventeenth centuries, the motet consists of a Church composition on sacred words sung by voices in a number of parts, each of which pursues an independent course, combining with its fellows to form an elaborate harmonic structure. Imitation abounds, i.e. a theme having appeared in one part, is promptly imitated at various intervals by the other parts in turn. This and other devices are in constant use to form a high complexity of musical architecture; but the effect of the whole has in the best examples a certain noble simplicity of feeling.

The words of the Mass were similarly treated during these centuries, with still greater elaboration. Many such masses have been written, of more ingenuity than beauty; but once again, in the finest masterpieces, complexity of technique is made to serve the higher purposes of a pure and noble beauty.

For the historical development of this form of music, see under **MUSIC**. Its height was reached in Palestrina, Morley, Byrd and Gibbons.

MOTH. Moths and butterflies together form a large order of insects noted for the beauty of their colouring and for their habits

and life history. The name of the order, *Lepidoptera*, means "scale-winged." With few exceptions, the wings of moths and butterflies are covered with minute overlapping scales. These are really modified hairs, and give the colour to the insects' wings. There are two pairs of wings, supported on a framework of strong veins. The veins have so definite an arrangement that scientists use them as a basis for classification.

Though moths and butterflies look very much alike, there are certain characters that enable us to distinguish them. The antennae, or feelers, of moths are feathery and end in a point; those of butterflies are clubbed, each one ending in a little knob. The wings of moths, when at rest, are horizontal rather than folded back upon the body. Some moths have a peculiar fastening (*jugum*), resembling a hook and eye, that holds the fore and hind wings together in flight. This is never present in butterflies.

Habits. Moths usually fly by night, while most butterflies are seen in the daytime. The nectar of flowers is the chief food of these insects, to reach which they thrust a long slender proboscis, or tube, into the flower cup. A sucking proboscis, rather than biting or chewing mouth parts, is typical of most lepidoptera. Some moths feed also on the juices of fruits, while others do not take any food at all in the winged state.

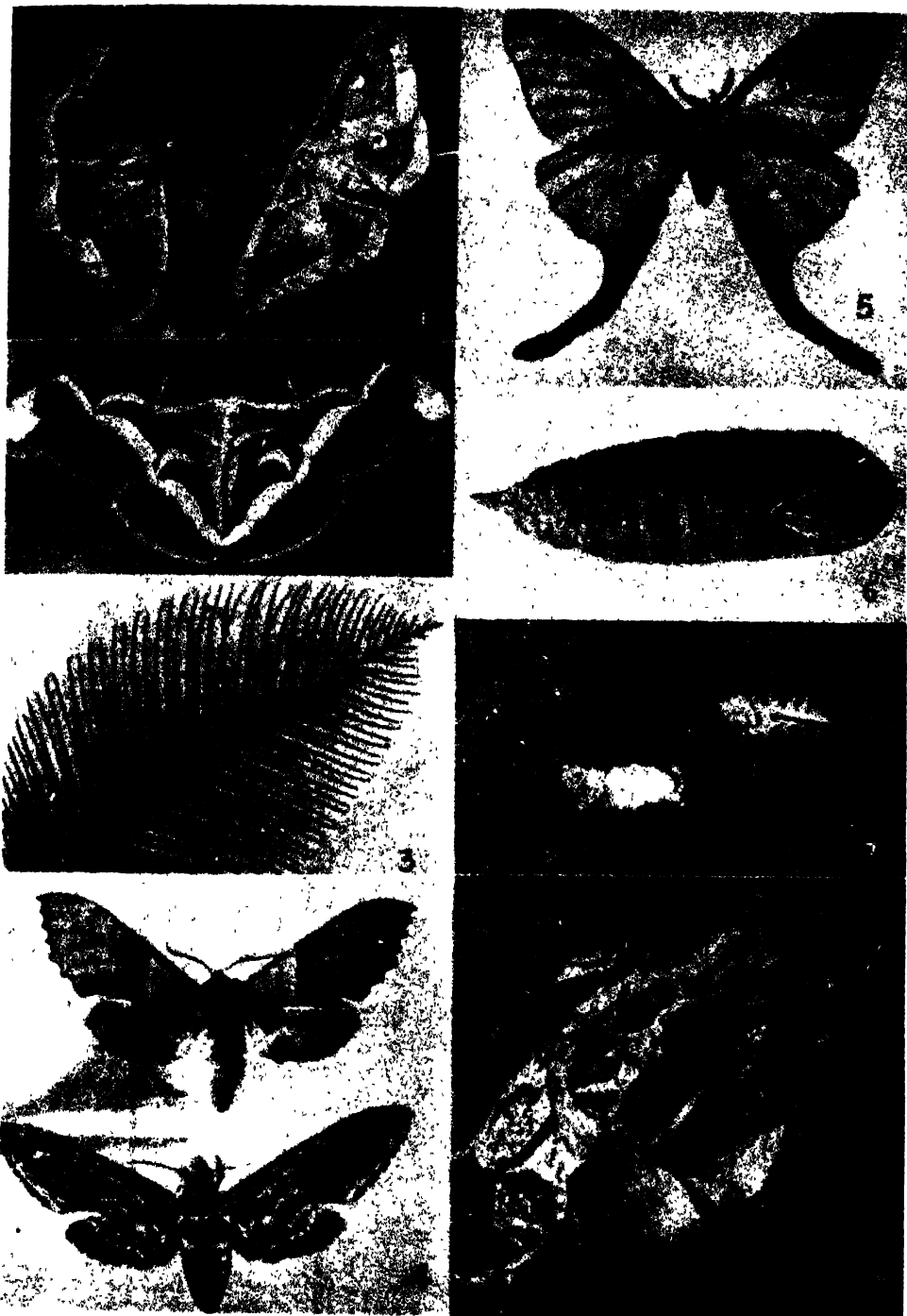
Butterflies and moths experience a complete metamorphosis, passing through four stages of development—egg, larva, pupa and adult. The larvae are naked or hairy caterpillars. During the pupal, or resting, stage of most moths, the developing insect lies in a cocoon of its own making, but some of the caterpillars pupate in the ground, encased in a hard skin. The cocoon of the Oriental silk moth supplies the material for silk fabrics and is of outstanding commercial value. See **SILK**.

MOTH SPECIES

The subdivisions of the moth group are too numerous to describe in full, but some of the more important and interesting kinds are the following—

Silkworms (*Bombycidae*). These moths are native to India, China and Malay and naturalized in Southern Europe. The caterpillars feed on the leaves of the mulberry tree.

Tussock Moths (*Lymantriidae*). The hairy caterpillars of these moths give the family its common name; they are characterized by having the hair arranged along the body in tufts (tussocks). The larvae of tussock moths are responsible for serious depredations to trees, especially those of the Gipsy, Brown-tail and Vapourer moths.



NOTES

1. Male and female Polyphemus moths (U.S.A.). 2. Cynthia moth (China). 3. Antenna of the male Polyphemus moth, magnified. 4. The Sphinx moth, male (below) and female. 5. Luna moth (U.S.A.). 6. Chrysalis of the Emperor moth, magnified. 7. Eggs, cocoon and wingless female of the Tussock moth. 8. Cocoon of the Cecropia moth.

Photos: Visual Education Service

Another common tussock moth is the Yellow-tail.

Looper Moths (*Geometridae*). The caterpillars in this family move by drawing the posterior legs up to the front ones, thus making a loop of the body, and then thrusting the forelegs forward and bringing the hind ones up again. The canker-worms are geometrids, and also the Magpie, Carpet and Emerald moths.

Hawk Moths (*Sphingidae*). These moths are also called *sphinx moths*, with reference to the attitude assumed by the caterpillars when at rest. The moths themselves look somewhat like hawks poised for flight. One species, the Death's-Head Hawk Moth (which see), has peculiar markings resembling a skull. See also **HAWK MOTH**.

Tiger Moths (*Arctiidae*). The tiger moths are distinguished by the bright colouring of their striped and spotted wing patterns. Their larvae are small caterpillars, whose heavy covering of hair has given them the popular name of "woolly bears."

Goat Moths (*Cossidae*). One of the largest of British moths is the Goat Moth, often $3\frac{1}{2}$ in. across the outspread wings, and whose huge caterpillar spends three or four years in the trunks of trees.

Burnet Moths (*Zygaenidae*). These include the crimson and black Burnet Moth, common on chalk downs.

Leaf Rollers (*Tortricidae*). These moths are so named because the larvae of many species roll up leaves or their edges to secure protecting shelters from birds while they are feeding and pupating. The Codlin Moth, whose larva is a serious pest on apple trees, belongs to this family; also the Oak leaf-roller, which has ravaged the foliage of oaks in Southern England during recent years.

Clothes Moths (*Tineidae*). These moths are known to housekeepers because the adult insects habitually lay their eggs in woollen fabrics, furs and feathers, upon which the larvae feed. The most common species is the Case-making Moth (*Tinea pellionella*), so called because its caterpillar spins a small pupating case out of pieces of cloth. The moth is a small creature with obscurely marked greyish-yellow forewings and greyish hind wings.

MOTH BALLS. See **NAPHTHALENE**.

MOTHER CAREY'S CHICKEN. A name given by sailors to the small stormy petrels which are found far out to sea. See **PETREL**.

MOTHER-OF-PEARL, or **NACRE**, *nay'ker*. The lining of shells of certain sea animals, such as the oyster; it varies in colour from pale greyish-blue and pink to deeper purple and green. Such shells are found off the coasts of tropical countries, particularly around the South Sea Islands, Panama, Cuba,

Lower California and Australia. Nacre is used extensively in the manufacture of pocket-knives, buttons, beads, umbrella handles, and for inlay work in wooden furniture. Shells of finest quality come from Australia and Manila. Some inland waters also produce mother-of-pearl shells.

MOTHERWELL. A Police Burgh of Lanarkshire, Scotland, with a population of 64,708 in 1931, situated on the River Clyde, and served by the L.M.S.R. It is a modern commercial and industrial town which has shown considerable growth within the last fifty years, due mainly to its proximity to the Lanarkshire coalfields and the ease with which goods can be transported on the Clyde. The modern industries include iron and steel works, and engineering works producing machinery for use in the collieries. Steam cranes are a speciality. The town is built on a ridge well elevated from the river, and most of the streets radiate east to the Calder Stream and west to the Clyde.

MOTHERWORT (*-wort*). A wild plant, found in parts of Europe, but not common in England or Scotland. Found in abundance in North America, it grows in hedges or on waste ground. Its flowers, which open in August, are usually crowded whorls, purplish-pink in colour, but sometimes white, with a downy upper lip. It is a perennial. The plant grows erect, the branched stem being normally about 3 ft. in height. Foliage is of a dull green and the lower leaves are palmate in form, deeply cut into five or three narrow-pointed segments. The plant has a strong, disagreeable smell.

Scientific Name. The Motherwort is of the *Labiatae* family. It is known as *Leonurus cardiaca*, because the plant was formerly supposed to cure heart-burn and "heart-ache," as melancholia was sometimes described. It has been used in Russia as a cure for canine diseases.

MOTION, LAWS OF. See **FORCE**; **MOMENTUM**; **RELATIVITY**.

MOTMOT. A handsome bird with plumage of blue, black, green and cinnamon, having the tail feathers much elongated; found in the American continent from Mexico to Brazil. A motmot native to Brazil is sometimes called *houliou*, from the sound produced when the bird nibbles the barbs from its tail feathers.

Its nest is built in holes of trees or in a round hole at the end of a tunnel bored in banks along streams. The eggs are a glossy white or cream colour, and number three or four. These birds belong to the same order as the kingfisher (which see) and resemble the jays.

Classification. Motmots are placed in the family *Momotidae*, in which they form the sub-family *Momotinae*. There are several species.

MOTOR-BOAT. A small boat propelled by a light internal-combustion engine or by electricity, but not by steam. Small boats are from 16 to 40 ft. in length, and

water. The motor is placed low down and firmly fastened to the boat, so as to give firmness and ballast to the entire structure. The propeller shaft slants downward, and



MOTOR-BOATS

1. Gar Wood, the American racing driver, and his mechanic in "Miss America IX."
2. An outboard motor-boat on a Canadian waterway.
3. Outboard racing craft

Photos: British Motor Boats Ltd.; Topical

large ones from 40 to 65 ft. A small boat with a 12 h.p. engine may have a speed of 20 miles an hour. The world's motor-boat record is held by Com. Wood of the U.S.A.

may be attached directly to the motor, connected with it by a clutch. The motors are reversible, so that the boat can be moved forward or backward. The fuel tank is



MISS ENGLAND

The famous racing motor-boat piloted by Sir Henry Segrave.

Photo: Thornycrofts

with a speed in excess of 128 m.p.h., gained on Lake Michigan. The average pleasure boat has a speed varying from 10 to 20 miles an hour, though "speed boats" often reach 40 m.p.h.

The boat is so constructed that the bow is narrow and does not sink far into the

placed in the bow, high enough above the motor to enable the fuel to flow to the cylinders without the use of a pump. In the newest patterns, steering is by a wheel similar to that used in the motor-car.

A number of small, inexpensive motors, so constructed that they can be attached to

a rowing-boat, are on the market. By the use of such a device, any rowing-boat with a keel and rudder can quickly be converted into a motor-boat. Such devices are called *ouboard* motors.

Motor-Ships. The motor-boat was designed for pleasure, but its advent had a marked influence on commercial water transport. During the past ten years, motor-ships have begun to displace steam vessels in the mercantile fleets of many countries. The Italian motor-vessel *Augustus* has a gross tonnage of 32,650. In 1935 the total tonnage of motor-ships of the British Empire exceeded 3,100,000 and that of Norway exceeded 1,900,000. Many river gunboats for use in the East are being fitted with petrol engines.

MOTOR-CAR. It is probable that, wireless apart, no other single discovery has so influenced social habits and life throughout the world as the motor-car.

The motor-car banishes distance. It brings us into closer contact with people in varying spheres of life, and it enables us to see and study a constantly changing panorama which enlarges the boundaries of our patriotism.

Motoring is not the pleasure of merely a few. Advances in design and construction have brought motoring within the reach of the artisan, even if the Chancellor of the Exchequer, considering that the national revenue demands it, taxes the pleasure so heavily that many cannot afford it. Cars



MORRIS OXFORD, 1913

This model had a number of worthy successors.

Photo: Morris Motors Ltd.

are to be bought on the easiest of terms, and to-day, in England alone, over 1,350,000 cars are in continuous use.

The daily Press tends to divide the community into two classes—pedestrians and motorists. Such a distinction is arbitrary and artificial. Every pedestrian relies for his livelihood upon the benefits of road transport. Every motorist has a pair of legs

which he uses far more than his car. Practically every pedestrian desires to own a motor-car; practically every motorist, at one time or another, has been without one.

Historical. As far back as 1680 the idea of a horseless carriage was conceived by Sir Isaac Newton; later, from time to time,



BENZ (1900)

Photo: Photopress

various other types were invented, tested and forgotten, so far as commercializing them was concerned.

In 1886, Gottlieb Daimler constructed a twin-cylinder internal combustion engine which was used at the time to propel a launch. He covered his invention by various patents, and these were later taken over by a Frenchman, M. Levassor, who designed the original form of transmission system, in conjunction with M. Panhard, which has not been improved upon to any great extent even to-day.

Government restriction upon motor-car development has been present in Great Britain from the earliest days of the industry. In England, until 1896, motor-cars were prohibited from travelling at a speed in excess of 4 miles an hour, and, even then, they were to be preceded by a man waving a red flag.

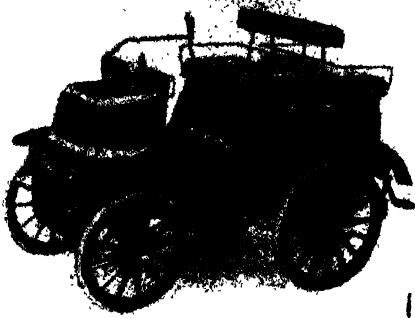
With the abolition of the red flag law, certain British engineers turned their attention to the manufacture of motor-cars and, before the end of the nineteenth century, several different types were being manufactured. In the last years of that century motor racing was already taking place. In England racing was forbidden, but English drivers were competing in continental races, but not with British cars, for the short-sighted policy of prohibiting racing made it impossible for the pioneers to obtain that necessary experience which comes only of racing.

The opening of the track at Brooklands—built at the expense of an enthusiast, Mr. H. F. Locke-King—in the face of severe criticism, did much to improve British cars,

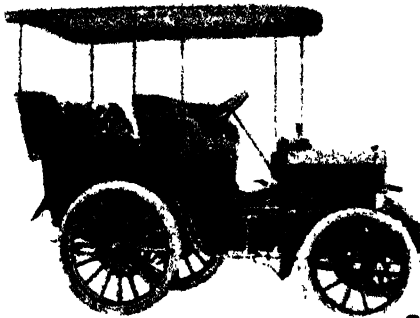
and soon we were able successfully to compete with the best that the Continent could produce. Before the motor industry became properly established in Great Britain, the freedom of the British market to all foreigners was responsible for a steady flow of

the R.A.C. had made it necessary for British manufacturers to design small capacity engines capable of a high performance; but, at the same time, a limit was necessarily imposed upon the size of the car, and that is largely why England is the home of the small ("family") car.

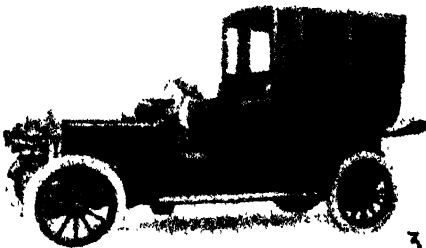
After some years of endeavour to produce in perfection cars of this type, the export side of the British motor industry began to grow. American cars of high horse-power,



1



2



3

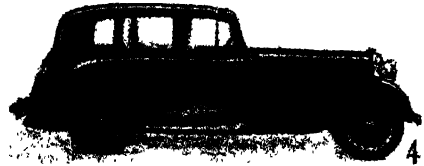
DAIMLER CARS

1. 6 h.p. twin-engined wagonette, 1896. 2. King Edward VII's car. 3. 38 h.p. landaulette, 1906.

Photos: Daimler

foreign cars into the country. The heavy taxation of £1 per horse-power per annum¹ on the basis of a formula agreed upon with

¹ Reduced to 15s. per horse-power as from 1st January, 1935.



4

MODERN "STRAIGHT EIGHT" SALOON

Photo: Daimler

developed because there were no restrictions by taxation on engine capacity, held most European and many other overseas markets. The exchange rate, for export purposes toward the end of 1932, operated against the Americans, and, at the same time, economic conditions throughout the world were caus-



10 H.P. TWO-CYLINDER ROLLS-ROYCE

This model was one of the first three to be made.

Photo: Rolls-Royce Ltd.

ing people to reduce their expenditure in every direction. But, once having owned a car, it is impossible to do without it. A demand for new cars existed on the Continent. America could not economically fill it because of the poor exchange value of the dollar; the foreigner was forced to spend less owing to straitened circumstances. The English light car was the only model able to meet the demand, and big business in this type was carried out on the Continent.

For similar reasons, other new markets were opened, and British car manufacturers

have at last come into their own. They have been helped in the meantime by the reduction of taxation and the consequent demand for larger cars in England, accompanied by a fall in production costs.

The number of motor vehicles of all types in use in Great Britain is approximately

tion are proceeding slowly, but the Government appears to be realizing its duty both to motor transport and to the country in general, and in 1935 made a grant of £100,000,000 for road improvement, an item in its election programme. Normal expenditure is £70,000,000 per annum.



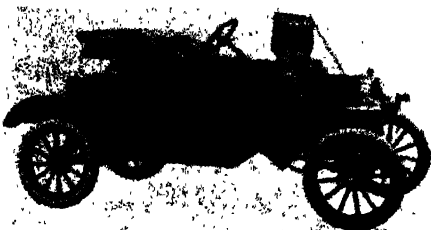
"OLD CROCKS" START FOR BRIGHTON

The two foremost cars shown crossing Westminster Bridge on 17th December, 1935, are a Fiat Darracq of 1898 and an Albion of 1900.

Photo: Central

2,200,000, while new vehicle registrations each year are about 275,000. This compares with new vehicle registrations in the U.S.A. of 1,440,000, in France of 201,000, in Canada of 61,000, in Germany of 50,000, and in the

The introduction of a speed limit of 30 miles per hour in built-up areas and the erection of "beacons" at crossing-places, together with the institution of driving tests, have contributed to a lessening in road



FORD MODEL N
("Tin Lizzie")

Photo: Ford Motor Company

Union of Soviet Socialist Republics of 40,000. Thus the total annual world production of vehicles is well over 2,000,000.

The total mileage of public roads in Great Britain is approximately 177,500, 152,000 being in England and Wales, and 25,500 in Scotland. Road widening and reconstruc-



FORD "V8" (1936)

Photo: Ford Motor Company

fatalities and injuries. How much it is difficult to ascertain, since before the introduction of restrictions there had been a slight slackening-off of accidents, due to an awakening feeling of responsibility on the part of motorists and pedestrians. See HIGHWAYS.

Design. The motor-car consists of two main parts—the chassis and the body—each part complete in itself, inasmuch as the chassis can be driven without having the

body attached, although it is not of very great service without it.

The chassis consists of seven main sections: engine, transmission, rear axle, front axle and steering, chassis frame, brakes, fuel system and electrical system.

Power is produced in the engine and passed via the transmission (clutch, gearbox and propeller shaft) to the rear axle, and thence to the rear road wheels, which push the car forward or backward. For a description of the operation of the engine, see article under PETROL ENGINES.

Owing to the great heat generated by the explosions, it is necessary to arrange some cooling device. The cylinders are surrounded by water "jackets," and water passes from the radiator into the engine at the bottom, through the water "jackets," and out of the engine into the radiator at the top, operating all the time on the thermo syphon system.

The Transmission Line. It is obvious that if the drive from the engine to the rear axle is "solid," as soon as the engine is started it will drive the rear wheels. The power of the engine, therefore, must be applied to the wheels gradually and, in any case, must be entirely isolated from the wheels when the car is required to be stationary with the engine running.

The transmission line consists of the clutch, gearbox, propeller shaft and axle. The power of the engine is conveyed to the rear axle only when a gear is engaged.

The clutch consists of three main parts: the flywheel and back plate, fastened to the



MOTOR-CAR MANUFACTURE

Above: Engine testing. Below: The finishing line. As the motors slowly move along on the line the last details are added.

Photos: Austin Motor Company.



CYLINDERS IN THE MAKING

This powerful diamond drilling machine bores the holes in the cylinders in one operation.

Photo: Ford Motor Company

engine, and the centre plate, fastened to a shaft which connects with the gearbox. When the engine is running, the plates are held together by a series of strong springs, and the engine power is transmitted from the flywheel through the centre plate to its shaft, which runs into the gearbox, where it is fitted with a fixed gear-wheel. There is a second shaft in the gearbox fitted with a fixed wheel, which is always in mesh with that on the clutch shaft, so that the drive goes from the engine through the fixed gears to the layshaft, on which there are a series of other fixed gears. When it is desired to engage gear, the clutch pedal is depressed, disengaging the two clutch plates and, therefore, the drive from the engine, enabling a gear to be selected by moving the gear lever.

Returning to the gearbox, the layshaft gears are arranged to mesh with the corresponding gears on another shaft, which slide

along this shaft, to mesh when the gear lever is operated. When the clutch pedal is released, therefore, the drive goes from the engine to the clutch shaft fixed gear;

Every component is placed in its appropriate section of a rigid frame. The braking system is controlled by the driver by means of a foot pedal for service work and a hand



THE "MOTOR SHOW" AT OLYMPIA

Photo: Central

thence to the layshaft gear, which, in turn, drives the mainshaft attached to the propeller shaft and thence the rear wheels. The gear wheels in the gearbox are of different

lever for parking. Brake drums are fixed to all four wheels, and pressure on the pedal causes shoes inside the drums to expand and to rub against the drums, thus decreasing



EARLIEST AUSTIN "SEVEN" WITH 1936 MODEL

Photo: Austin Motor Company

sizes, thus giving different ratios, with the object of starting the car off smoothly from rest, and working upward to a direct drive as momentum increases.

speed. The front axle carries the steering mechanism, and both front and rear axles are attached to the chassis by means of road springs, which absorb the shocks occasioned

by bumps or depressions in the road. This action is often assisted by shock absorbers attached to the springs. Latest developments embody separate springing of each wheel.

Lighting is controlled from a battery which is kept constantly charged by a dynamo driven from the engine.

Transmission Developments.

There are several different methods of transmission and of braking, though fully to explain these would occupy a whole volume. It would, however, be of interest to refer particularly to two systems—the fluid flywheel and self-changing gearbox, and the free-wheel, which represent practically the only developments in transmission since the motor-car, as we know it to-day, was initiated.

As will already have been seen, the drive between engine and gearbox in normal models is a solid one, the drive being disengaged by the actuation of springs; with the fluid flywheel there is no clutch. This



SIR MALCOLM CAMPBELL'S RECORD-BREAKING CAR

Photo: Topical

device consists of two members, one fixed to the engine and the other to the transmission, and so arranged that, when the engine turns, a succession of streams of oil passes from the driving member on the engine to the driven member on the transmission, through a series of small orifices. When the engine is idling, this flow of oil takes place, though not with sufficient force to have any effect as regards turning motion on the driven member. As the engine speed increases, however, the force with which the oil is shot from one series of orifices in the driving member to the corresponding series in the driven member increases, and ultimately a "solid" drive is obtained. This is obtained smoothly. Unlike the old system, it is possible to stop the car, leaving the engine running, with any gear still engaged.

In most cases, a preselective gearbox is fitted in conjunction with the fluid flywheel. This is entirely different from the old form

of gearbox, the drive being taken through contracting bands instead of by gears.

The free-wheel was invented some thirty years ago. It has not been generally applied



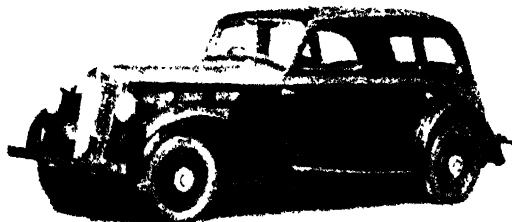
40-50 H.P. ROLLS-ROYCE "PHANTOM III"

Photo: Rolls-Royce Ltd.

to motor-cars. It operates on the same principle as the well-known bicycle system, and, when the engine is not pulling, the car will coast down hill. With the fixed gear, when pressure on the accelerator is released, the engine acts as a brake on the car.

Every year since the beginning of the motor-car industry has seen advances in design. Those in body design are the most noticeable, and there has been a steady advance from the original box on wheels to the large and heavy open touring car; the square type saloon; the modern streamlined car of beautiful lines, in which wings, running boards and body blend in perfect harmony. Pressed steel is now being used extensively for coachwork.

Commercial Vehicles. From earliest days, the value of the mechanically-propelled vehicle for goods transport has been appreciated. The design of commercial motors and large passenger vehicles follows very



MORRIS 16 AND 18 H.P. SALOON

Photo: Morris Motors Ltd.

closely the accepted motor-car practice, though on more generous lines. The commercial vehicle side of the industry has, however, been responsible for several important developments in design, owing to the rather



START OF THE INTERNATIONAL TROPHY RACE AT BROOKLANDS

Photo: Central

different sphere of action of the commercial motor. Thus, the desire for larger capacity buses led to experiments with six-wheel vehicles, the four rear wheels of which were all driving, and the first of this type appeared on the roads, in service in Wolverhampton, in 1926. To-day these vehicles are in service



A COMPETITOR NEAR THE TOP OF THE BANKING AT BROOKLANDS

Photo: Fox

for both passenger and goods transport in every part of the world, though in London improved four-wheeled buses are preferred.

One manufacturer has supplied for War Office use, rigid six-wheeled and rigid eight-wheeled vehicles in which every wheel drives. The latter type is notable, as the four front wheels not only drive, but *steer*. The overall length of the vehicle is about 20 ft., it can be driven across a ditch 6 ft. wide without sinking into it, the only drop being

a little variation in the height of the road wheels, owing to the deflection of the springs.

Organization of Motoring. Since its inception, the motor industry has been organized to protect its own interests as well as those of its customers. And, for this reason, among others, it has made exceptional advances. It has sought and found a medium for effective self-expression to the public by its organized exhibitions, which commenced at the Agricultural Hall in 1901, and were held in later years at Olympia, and then at Earl's Court each October. Under one roof are the results of design, racing and manufacturing experience, gained under various conditions by thousands of men, and placed side by side for comparison by the motoring public.

Motoring enthusiasts have done much to popularize motoring, and have taught manufacturers a great deal. All over the country they have organized themselves into local clubs, holding rallies and trials.

Among important trials are numbered the London-Land's End, Scottish Six Days, London-Gloucester and London-Edinburgh, which are always supported by hundreds of motoring enthusiasts. The Royal Automobile Club has organized for some years past a 1000-miles rally, ending at Torquay, Hastings, Eastbourne and Bournemouth in turn. There are a number of starting-points throughout the country, as, for instance, London, Newcastle, Bath, Buxton, Harrogate, etc.; but whatever route is taken, each competitor has to cover at least 1000 miles, and has to check in at various points along the road section over a pre-arranged route. On the average, the road

section is completed in 44 hours, so that average speeds, over the whole time, vary from 20 to 25 miles an hour, according to the size of the car.

The popularity of these events is growing each year, and the majority of entrants are drawn from the motoring public, as distinct from the trade.

The two chief Associations for the benefit of motorists are the *Automobile Association* and the *Royal Automobile Club*, which are both well-organized bodies of great influence. Both organizations maintain staffs of highly skilled mechanics, dressed in distinctive uniform, who patrol the roads and are always available to assist members (and, indeed, motorists generally) in any matter affecting motoring. Membership probably totals about 1,000,000.

The Automobile Association was originally formed to defeat the system of police trapping for offences against the 20 m.p.h. speed limit. Now it has many other duties. It has erected over 60,000 village signs, in addition to thousands of direction and warning signs. It provides legal advice and defence for its members; it provides members with routes free of charge, to the extent of about 750,000 each year; its engineering department gives advice and assistance in case of technical difficulties; and it has a foreign touring department which ensures trouble-free touring abroad.

The R.A.C. conducts much the same sort of service, besides controlling racing and sporting events in this country.

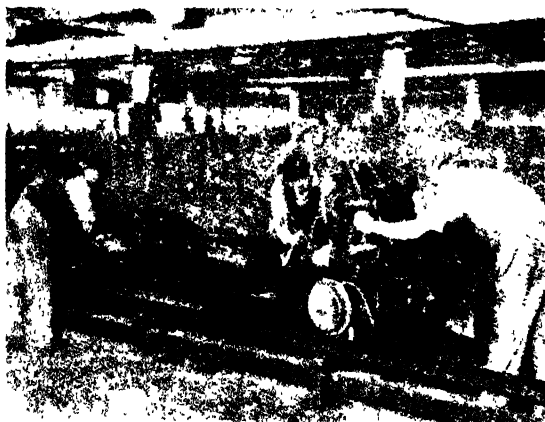
No car is allowed on the roads of this country unless it is licensed and insured. Licensing is fixed at the rate of 15s. per horse-power for motor-cars, and graded on unladen weights for commercial vehicles and by seating capacity for passenger vehicles. Every vehicle must carry *some form of insurance*. The law is considered to have been met if the driver carries a certificate from an insurance company saying that the car is insured. There are many pitfalls for motorists in insurance, and it is desirable always to obtain advice from a good-class insurance broker, whose business it is to know everything about insurance and the companies selling it.

Every driver, also, must have a driving licence, which he obtains on payment of a fee of 5s. after he has completed an application form to the satisfaction of the licensing authorities. The driving licence is not issued until the motorist has passed the requisite driving test. A preliminary licence

is issued to those who wish to learn to drive.

The world's speed record is, and has been for some time, held by an Englishman, Capt. Sir Malcolm Campbell, who, in 1935, averaged over 300 miles per hour in his all-British car, "Bluebird," at Salt Lake, Utah, U.S.A., breaking his own record of 272.108 miles per hour made in 1933, at Daytona Beach.

Types of Car. The various styles prevailing in England are the saloon, close-coupled saloon, open sports, sports coupé, and two-



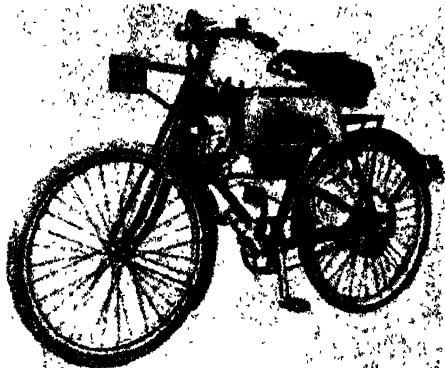
FIRST STAGE IN CHASSIS ASSEMBLY LINE
Here the chassis is simultaneously fitted with the engine unit, front axle, rear axle, and propeller shaft.

Photo: Morris Motors Ltd

and four-seater tourers; these are given in the order of their popularity. The lowest-priced car in England is offered at £100. It is a saloon model of the 8 h.p. type.

MOTOR-CYCLE. A form of bicycle provided with an engine for mechanical propulsion. Sometimes, to increase the passenger accommodation, a boat-shaped body, known as a sidecar (capable of carrying one or two persons), is fixed alongside the machine, and an additional wheel is provided on the chassis of the sidecar. The motor-cycle, in such a case, is usually referred to as a sidecar outfit or "combination," as distinct from a "solo" motor-cycle. Commonly one extra passenger is carried on a "pillion" seat fixed to the motor-cycle over the back wheel, close behind the driver. The principal advantages of the motor-cycle are: (a) the low initial cost, (b) the low taxation, (c) the high performance, (d) the low running costs, (e) the small space required for garaging, (f) easy maintenance and overhaul. Its disadvantages are: (a) lack of protection from weather, dirt, etc., (b) lack of comfort, (c) a narrower margin of safety than is given by

a motor-car. Motor-cycles are employed for numerous purposes apart from pleasure, among which may be mentioned the follow-



THE FIRST SCOTT MOTOR-BICYCLE (1902)

ing: light commercial transport (milk floats, etc.); Post Office use (dispatch of telegrams); Police patrol (keeping watch on traffic and pursuit of suspects); and Army purposes (dispatch riding). In connection with the last-mentioned, special types of machines have been evolved. There are armoured machine-gun sidecar outfits for holding up hostile forces, and caterpillar-track motor-cycles for cross-country use where roads are absent. In the realm of sport, motor-cycles are used for hill climbs, reliability trials, dirt-track, grass-track and road racing.

Historical. As far back as 1868, before the petrol engine, a steam-driven motor-cycle was produced. This machine had, of course, a boiler and small furnace, and the connecting rods were coupled direct to rear wheel cranks. In 1877, bicycles having ball-bearing hubs were built, and it was the introduction of ball bearings which enabled progress to be made in the design of internal combustion engines. The first petrol-driven motor-cycle was the Wolfmüller, which had

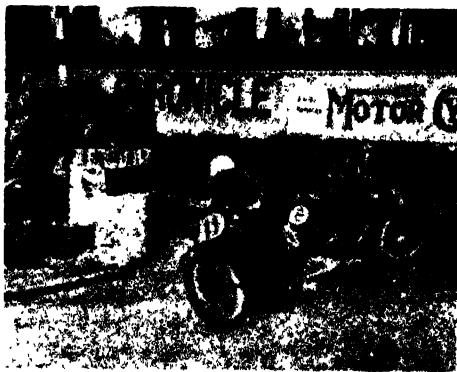


A SCOTT MACHINE OF 1908

a double-cylinder engine with tube ignition, surface carburettor, and the connecting rods coupled locomotive fashion to overhanging

cranks on the rear wheel axle. In 1885, Daimler designed a motor-cycle, and James Dunlop invented the pneumatic tyre, but during the next ten years little progress was made.

By the year 1898 light petrol engines were produced, and soon the crude tube ignition and surface carburettor were replaced by the battery and coil, and the jet carburettor. It was therefore not surprising to find enterprising manufacturers soon adapting pedal cycles, and attaching an engine in the most convenient position (pedals were still required for hill climbing). Among the early attempts at motor-cycle design round about 1900 may be mentioned the famous front-drive *Werner*, with the engine in front of the handlebars and rotating with the wheel; the *Minerva*, with the engine slung below the front down tube; the *Shaw and Dion-Bouton*, with the engine within the rear forks in front of the wheel; and the *Motosacoche*, with the engine carried in a sub-frame clipped to the cycle frame. Soon after the advent



COMPETITORS JUST AFTER COLLIDING AT GOVERNOR'S BRIDGE IN A RACE FOR THE MANX GRAND PRIX

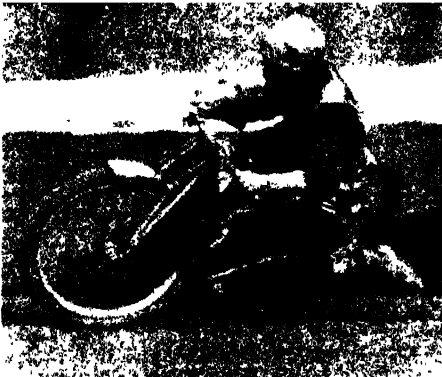
Photo: Central

of the motor-cycle with internal-combustion engine, tricarcs made their appearance.

The flimsy cycle frames to which engines were attached soon protested, and a break-away from bicycle design began about 1904 and has continued ever since. Frames were strengthened and fork springing improved; pedals, besides being inconvenient, became superfluous as engine design improved; it was found better to place the engine near the centre of the machine (the present-day position), and to use a belt for the drive, as this gave smooth transmission. An era of belt-driven 500 c.c. motor-cycles dawned about 1906-7 and continued for some time, and various types of engines were experimented with, including Vee twins, flat

twins, engines with detachable heads and overhead valves and even overhead camshafts. Automatic inlet valves completely disappeared. One of the earliest four-cylinder motor-cycles was made by a Major Holden. This machine had two horizontal steel-tube cylinders side by side with four pistons working on a single crankshaft. The engine was cowed in.

The founding of a motor-cycling journal (*The Motor-Cycle*) in 1903, the opening of Brooklands in 1907, and the running of the first Tourist Trophy 158-mile road race in the Isle of Man (won by a *Norton* at 36.2 m.p.h.), greatly stimulated interest in motor-cycling, and rapid strides were made in design. Racing has proved to be of inestimable benefit to the motor-cycle industry. In 1907, overhead valve engines became popular, and have remained so up to the



SPEEDWAY RACER IN ACTION
Photo Photopress

present; the famous *Douglas* flat twin made history, and two-stroke machines came into their own with the now famous water-cooled two-cylinder *Scott*. About 1912 various types of change-speed gears, such as epicyclic hub gears (e.g. *Humber*) and expanding pulley gears (e.g. *Rudge*), came into use, and made motor-cycles of more value for touring purposes. Magneto ignition became general about this time. The 1912 *Wulfrana* was one of the first machines to have a two-speed, countershaft gearbox and all-chain drive, and this machine was quickly followed by other examples. In 1914 came the War, and motor-cycles were largely forgotten, as far as the public was concerned. After the War a vast amount of research work done in connection with aero engine design was made available for designers and manufacturers, with the result that by 1922 motor-cycles had become thoroughly reliable vehicles. Lubrication, however, for several years

depended on hand pumps, until automatic systems came into general use in 1926 onward. In 1920-1 motor scooters appeared, but they did not "catch on."



NORTON MODEL 50

Recent Advances. The tendency in recent years has been to raise the power-weight ratio as much as possible, improve reliability, eliminate mechanical and exhaust noise, enclose all working parts, simplify driving and maintenance, and render the machines pleasing to the eye and comfortable to ride in all conditions of road and weather. Now and again some completely unorthodox machine makes its debut, but many have had a sadly brief existence. Among such machines may be mentioned the all-enclosed *Ner-a-Car*. During the past few years several ingenious and very successful four-cylinder designs have been produced, among which may be mentioned the *Triumph* vertical four, and the *Ariel* "Square Four" overhead camshaft model, with a monobloc vertical, four-cylinder engine, having two crankshafts geared together. In 1933 a *B.S.A.* was introduced, having Daimler fluid flywheel transmission and Wilson preselective gearbox.

Single-cylinder four-stroke engines still enjoy the greatest popularity, and although the 500 c.c. type remains supreme, there has been a tendency for smaller engines to become popular, particularly 250 c.c. overhead valve power units, which are now capable of



MODERN SPORTS MODEL
Photo: Scott Motors

70 m.p.h. Four-stroke engines are made in sizes varying from 250 c.c. to 1000 c.c., but above 600 c.c. the majority of engines have two or more cylinders. Overhead valve

engines are now about as popular as side valves and equally reliable, and, of course, much faster.

Air-cooled engines are used almost universally, with perhaps one exception, the two-stroke Scott. Two-stroke engines are very popular, especially the famous little Villiers power units. Ignition is usually by a combined lighting and ignition generator, there are various types, or by coil. All machines now have electric lighting, and both three- and four-speed gearboxes are employed. Transmission is by chain throughout, the front chain usually being enclosed in an oil-bath chain case (except where unit construction of engine and gearbox is provided). The speed record for motor-cycles (one kilometre) stands at over 150 m.p.h.

MOTOR, ELECTRIC. See **ELECTRIC MOTOR**.

MOTOR INSURANCE. This is a comparatively new class of accident insurance, the first motor-cars appearing on the roads just before the end of last century. Since then there has been remarkably rapid development, so that at the present time there are more than 2,200,000 licensed vehicles in this country, and in spite of safety precautions, more than 200,000 people are injured in road accidents each year.

By the Road Traffic Acts, 1930-1934, compulsory motor insurance against third party risks was introduced, and at the same time motor insurance business was brought within the scope of the provisions of the Assurance Companies Act, 1909.

In this class of business there is a tariff, but there are many non-tariff companies in existence, and the business is also undertaken at Lloyd's.

For the purposes of classification, road vehicles are divided into motor-cycles, private cars used for social, domestic and pleasure purposes only, private type cars used for business purposes, and commercial vehicles, subdivided according to type and carrying capacity. Whilst every motor vehicle owner must be insured against third party risks and some policies cover this liability only, policies are also issued insuring third party liability and loss or damage to the vehicle by fire or theft.

Comprehensive policies include accidental damage to the vehicle due to collision and other causes, and also such extra benefits as limited personal accident cover for the insured. Mechanical breakdown is not covered, although damage to the vehicle resulting from an accident caused by mechanical breakdown is within the scope of the policy.

MOULD. Moulds are plants without chlorophyll, belonging to the same botanical

class as *fungi*. They are parasitic and grow in damp places. A bread mould, for example, starts from a dust-like particle called a spore, which swells, germinates, and sends out microscopic threads, some of which are like hair roots, others like branches of the threads, in turn endlessly branched. Each upright thread develops a *sporangium* or spore case, no larger than a pinhead, in which thousands of spores appear. When the cases break open, the spores float away and in turn reproduce the mould in any damp place. Mould will not grow in cold air and will wither in sunlight. Because they help the decomposition of dead organisms and waste matter, moulds add to the fertility of the soil. See **FUNGI**.

MOULTING. The act of annually shedding or casting the hair, feathers, skin, horns, etc., of animals, birds, and insects.

The word is commonly used for birds, but shell-fish who shed their entire coat of shell, and deer their horns, are likewise said to be moulting.

The snake does not make an annual affair of casting its skin. Often a serpent sloughs its coat as many as nine times during a year. The act is largely governed by the age and vitality of the reptile, and often months may elapse between the change. Young snakes shed their skin more often than the adult. This is usually on account of rapid growth. The sloughing of a toad from beginning to the end takes rather less than one hour. The discarded skin is then rolled up into a tight little ball, pushed into its mouth and swallowed. The moulting of all furred and feathered creatures occurs before the heat of the year. In birds it can, however, be induced by hunger or fright at any time.

MOUND BIRD OR MEG'APODE. Australian birds of peculiar nesting habits. Instead of depositing the eggs in a nest and brooding on them, a mound bird lays them in a large heap of grass, foliage and earth, and leaves them to be hatched by the heat of the decaying vegetable matter. The young, which are fully feathered when hatched, dig their way out of this crude incubator. The eggs are white when freshly laid, and are of unusual size, those of the largest birds being from 3 to 4 in. long. The same mound is used season after season. There are some species in this family that deposit their eggs in holes in sand, trusting to the heat of the sun to hatch them.

The mound birds are dull-coloured and of varying size. The smallest are about as large as a pigeon; the larger attain the size of a small turkey. They are commonly known in Australia as *jungle fowl*. A familiar species inhabiting New Guinea and Eastern Australia is known as the *brush*

turkey. Another species is the *native pheasant* or *mallee hen* of South and West Australia.

Scientific Names. The mound birds constitute a family known as *Megapodidae* (a name meaning "large-footed"). The best-known Australian species is *Megapodius tumulus*. The brush turkey is *Tallegalla lathamii*.

MOUNTAIN. To the geologist, a mountain reveals its origin from one or more of three agencies—igneous activity, erosion, and dynamic movements of the earth's crust. Most mountains arise out of great earth movements—gigantic grindings and twistings which the earth's crust underwent in former periods of time. Sometimes the mountains resulted from a single fold, sometimes from several. The process of folding is usually very slow, as is proved by the fact that rivers flowing across the folds will often cut their channels downward quite as fast as the rock is pushed upward. Lofty systems are thus cut by rivers, which would have been turned aside if they had dug their channels more slowly.

Erosion produces mountains by removing part of the rocks of uplifted areas, leaving the remainder elevated above the surrounding land. Volcanoes built up by successive eruptions are types of igneous mountains.

MOUNTAIN ASH. The name of certain species of trees belonging to the rose family. They grow at high altitudes, and because their foliage is like that of the common ash (that is, they bear compound leaves made up of many individual leaflets), they received their present name. The tree has bright-red berries and white flowers, and is often called the *rowan*, being much planted in gardens. The berries are poisonous.

In former times, it was believed that the rowan tree would drive away evil spirits, and walking-sticks of its wood were popular for this reason.

Scientific Name. The species belong to the family *Rosaceae*. The rowan tree is *Pyrus aucuparia*.

MOUNTAINEERING. Mountaineering as a sport is of comparatively recent development. About 1850, English people began to frequent the Alps and to conquer the peaks one by one, until by 1880 almost all had been scaled.

After 1880, attention was drawn for the first time to the merits of English hills from a rock-climbing point of view, and enthusiasts soon fired other sportsmen with the desire to emulate their feats. Starting first with gully climbs, many hitherto inexperienced mountaineers were soon attacking the open slabs. To increase the thrill, routes of great severity were mapped out.

Thus mountaineering and rock-climbing have become highly technical and organized sports. The essentials of mountaineering

equipment are the boots, nailed with special mountaineering nails. One can, if one wishes and can also afford them, wear some of the special clothes designed to withstand the effects of wind and cold, but these are by no means essential for climbing in this country. For climbing abroad in places of high altitude and severe weather conditions, specially designed weatherproof clothing is, of course, absolutely necessary. Ice axes are only used for climbs involving courses of snow or ice, as are also the special long



MOUNTAINEERING HAZARDS

The dangers of careless mountaineering can be appreciated, for it is easily seen that a fresh fall of snow would hide the crevasse.

Photo: Photopress

spiked shoes or "crampons," which are strapped on over the boot. The rope is invariably used when climbing, not (as many people imagine) as a means of swarming up and down the rocks, but first and foremost as a safety link between two climbers. It is used as a protective measure in case one of the party falls, when he will be held by the rope. The *modus operandi* in rock-climbing is to make use of the innumerable small holes which are to be found on any rock face, so that the nails of the boots grip them, and to develop the art of balancing the body.

In snow and ice work it is again a matter of balance, and a man can force his way by natural means up an ice slope angled at 60°.

The element of risk in mountaineering is not so great as ordinary people imagine, as all

SOME MOUNTAINS OF THE WORLD

Everest (Himalayas). The world's loftiest peak. Named after Sir George Everest who calculated the height in 1841.

Godwin-Austen (Himalayas). The second highest peak in the world.

Kinchinjunga (Himalayas). The third highest mountain in the world.

Nanda Devi (Himalayas). The highest peak scaled by man.

Aconcagua (Andes). An extinct craterless volcano. The highest mountain in America.

Sahama (Andes). One of the greatest of the Andes mountains, situated in the west of Bolivia near the boundary of the Chilean province of Tacna.

Illimani (Bolivia). An extinct volcano one hundred miles east of Lake Titicaca, which is the boundary between Bolivia and Peru.

Chimborazo (Andes). Once thought the highest peak in the New World; actually there are eight higher. Perpetually snowcapped for half-a-mile from its summit. First climbed in 1880.

McKinley (Rockies). Highest mountain in North America, situated in Alaska. The South peak was climbed in 1913; the lesser North peak in 1919.

Cotopaxi (Andes). The world's loftiest active volcano. The last eruption was in 1903. The crater is 2600 feet in diameter and 1500 feet deep. Even in eruption lava seldom flows from it.

Logan (Rockies). Highest mountain in Canada and second highest in North America.

Kilimanjaro (Tanganyika). An extinct volcano in East Africa. It has twin peaks.

Demavend (Persia). Loftiest mountain in Persia, it is a few miles north-east of Teheran.

Elburz Peak (Caucasus). One of the only two peaks in the Caucasus mountains to show volcanic origin.

Orizaba (Mexico). Sometimes called Citlaltepetl or Star Mountain. An active volcano about seventy-five miles west of Vera Cruz. The tallest peak in Mexico.

Maipo (Argentina). An active volcano south-east of Santiago, close to the Chilean borders.

Popocatepetl (Mexico). The "Smoking Mountain," perpetually snowcapped. It is no longer active.

Kenya (Kenya Colony). One of the highest mountains in Africa. Situated only about twenty miles from the Equator, it is perpetually snowcapped.

Ararat (Armenia). A volcano with two cones, which is supposed to have been the resting-place of Noah's ark. The last eruption occurred in 1840.

Stanley (Ruwenzori). Highest mountain in the Ruwenzori range, Central Africa. Named after Sir Henry Stanley, who first made the range known during the Emin Pasha relief expedition of 1887-89.

Kazbek (Caucasus). One of the only two peaks of volcanic origin in the Caucasus mountains.

Mont Blanc (Pennine Alps). Highest European mountain outside the Caucasus. Source of numerous glaciers, including the Mer de Glace. The railway (cable line) is to be carried up to 13,000 ft.

Matterhorn (Pennine Alps). Forty miles east of Mont Blanc on the boundary between the canton of Valais and Piedmont, Italy. First climbed in 1865.

Whitney (U.S.A.). Highest mountain in the United States.

Mauna Kea (Hawaii). An extinct volcano, the highest mountain in the Pacific Islands. Snowcapped during most of the year.

Mauna Loa (Hawaii). A volcano that erupts about every five years. The famous Kilauea crater is on the east slope. The mountain is in the Hawaii National Park.

Jungfrau (Bernese Alps). Considered the most beautiful mountain in the Swiss Alps. It was first climbed in 1811. An electric railway now runs some 11,000 feet.

Robson (Canada). One of the highest mountains in Canada. The perpetual covering of the cap with ice and snow is due to high latitude rather than altitude.

Fujiyama (Japan). The sacred mountain known throughout the world through Japanese art and legend. It is an extinct volcano, the last eruption having been in 1707.

Erebus (Antarctic). A volcano in South Victoria Land, usually associated with Mount Terror, thirty miles away.

Cook (New Zealand). Highest mountain in New Zealand, situated in South Island.

Simplon (Swiss Alps). Famous for the pass—6592 feet above the sea—engineered by Napoleon in 1800-06 and for the railway tunnel, twelve and a half miles long, which is the world's longest main line tunnel.

Etna (Sicily). An active volcano. There were eruptions in 1886, 1911, 1923 and 1928. The first recorded eruption was in the eighth century B.C.

Olympus (Greece). On the borders of Thessaly and Macedonia. There are numerous other mountains of the same name in Greece and Asia Minor. It is the fabled home of the gods of mythology.

Sinai (Egypt). The scene of many incidents recorded in the Bible.

Ben Nevis (Grampian Mountains). Highest mountain in Great Britain.

Vesuvius (Italy). An active volcano. The eruption of 1906 completely altered its shape and reduced the height.

Snowdon (Caernarvon). Highest mountain in Wales. **Carrantaohill** (Macgillivuddy). Highest mountain in Ireland.

Scafell Pike (Cumbrian Mountains). Highest mountain in England.

SOME MOUNTAINS OF THE WORLD

OLD WORLD

Everest, 29,141 (est.)
Godwin-Austen, 28,250
Kinchinjunga, 28,156.
Nanda Devi, 25,645.

Kilimanjaro, 19,320
Demavend, 18,500...
Elburz, 18,471.....

Kenya, 17,040...
Ararat, 16,920.....
Stanley, 16,794.....
Kazbek, 16,446.....

Mont Blanc, 15,782..

Matterhorn, 14,782..

Mauna Kea, 13,784..

Mauna Loa, 13,675...

Jungfrau, 13,672....

Fujiyama, 12,391....

Erebus, 12,370.....

Cook, 12,349.....

Simplon, 11,117.....

Etna, 10,755.....

Olympus, 9800.....

Sinai, 6750.....

Ben Nevis, 4406.....

Vesuvius, 3668.....

Snowdon, 3560.....

Carrantuohill, 3414..

Scafell Pike, 3210....

NEW WORLD

...Aconcagua, 22,868

....Sahama, 22,349

....Illimani, 21,181

...Chimborazo, 20,700

....McKinley, 20,300

....Cotopaxi, 19,613

.....Logan, 19,539

.....Orizaba, 17,879

.....Maipu, 17,576

..Popocatepetl, 17,543

....Whitney, 14,496

.....Robson, 12,972



mountaineers, recognizing that their sport possesses certain definite and specified dangers, have developed a technique which obviates them to a very large extent. The majority of the accidents which do occur are due to carelessness on the part of the climber, in not observing one or other of the rules.

To-day all the mountains of Europe have been climbed by the obvious routes, and many of the mountaineers are now turning



TACKLING A VERTICAL ROCK FACE

Note climber's position away from the rock, keeping the body in balance, the rope between the leader and his companion being kept taut to prevent jerk in case of a fall; and the shoulder belay over the back of the second climber.

Photo: Photopress

their eyes toward the remoter parts of the world, such as the Himalayas, the Alaskan Mountains and the Greenland Mountains, where there are still virgin peaks. The highest mountain in the world—Mount Everest (which see)—still (1936) remains unconquered, though nearby peaks have been climbed. At the further end of the Himalayas, Kamet (25,400 ft.) was climbed in 1931, and Nanda Devi (25,645 ft.) in 1936, but Nanga Parbat, the highest peak in the British Empire, has defied several expeditions.

There are a number of mountaineering clubs in Britain, the senior club of all being the Alpine Club, with headquarters in

London. There are in addition approximately fifteen of what are commonly known as the senior clubs, most of which have been active for over twenty-five years. Recently, however, there have been springing up in a large number of towns all over the country and at the Universities, small but active mountaineering clubs.

MOUNTBATTEN. The present name of a princely family of Prussia, formerly Battenberg, which has played a part in the history of Bulgaria, of England, and of Spain. Prince Alexander of Hesse, who married Countess von Hauke, was given to understand that the marriage could be looked upon only as morganatic—that is, neither his wife nor his children could share his possessions nor bear his title. In 1853, however, the countess was created Princess of Battenberg, the name being taken from a little town of Hesse-Nassau, and her sons were accordingly known as princes of Battenberg.

The eldest son, Louis Alexander, Prince of Battenberg, became a naturalized British citizen, and entered the Royal Navy. In 1884 he married his cousin, the Princess Victoria, a granddaughter of Queen Victoria. His rise in rank in the Navy was steady, and was based on distinguished services. In 1911, he was made Second Sea Lord of the Admiralty, and in the following year was appointed Admiral of the Fleet. In 1917 he was made Marquess of Milford Haven, and the family name was changed to Mountbatten. He died in 1921.

The second son of Alexander of Hesse was the Prince Alexander of Battenberg, who was chosen Prince of Bulgaria when that country became self-governing in 1879. By reason of his real ability, as well as his devotion to his adopted country, he deserved well at the hands of the Bulgarians, but political troubles ran high, and in 1886 he was compelled to resign the throne.

A younger brother of the foregoing, Prince Henry Maurice, married the Princess Beatrice, daughter of Queen Victoria, and it was his daughter, the Princess Victoria Ena, who in 1906 became Queen of Spain as the wife of Alfonso XIII.

MOUNTJOY, CHARLES BLOUNT, EIGHTH BARON (1563-1606). The good looks of young Lord Mountjoy attracted the favours of Queen Elizabeth and led to a duel with the jealous Essex. The young men were reconciled and Mountjoy became one of the Earl's supporters, going with him on the expedition of 1597. He succeeded the discredited Essex as Lord Lieutenant of Ireland, where he defeated a Spanish force at Kinsale and forced Hugh O'Neill, Earl of Tyrone, to make submission. James I



MOUNT EDITH CAVELL

11,000 ft. peak in the Rocky Mountains, on the borders of British Columbia.

Photo: Canadian National Railways

created him Earl of Devonshire. His natural son, Mountjoy Blount (c. 1597-1666), was created Earl of Newport, and was rear-admiral in Buckingham's expedition to the Isle of Rhé. In the Long Parliament he opposed the King, but took his side when civil war began.

MOUNT OF OLIVES. See OLIVES, MOUNT OF.

MOURNING. This term, as ordinarily used, refers to the external symbols of grief for the dead or for some calamity. Almost every nation has had its special mourning customs. Those of the Jews are described in the following verse—

"Mordecai rent his clothes, and put on sackcloth with ashes, and went out into the midst of the city, and cried with a loud and a bitter cry" (Esther iv. 1).

The early Greeks shaved their heads in token of grief, while the Romans allowed their hair and beards to grow, and neglected their clothing. In more recent times, in most nations, restraint has been practised, and the signs of grief have been limited, in the main, to the wearing of certain colours. The Western nations have, without exception, adopted black as the mourning shade for garments, but other colours have been used in other parts of the world.

MOUSE. Mice are known everywhere except in a few islands of the Pacific, and domestic mice, originally from Central Asia, have followed man to all parts of the globe. Mice breed at all seasons, and often occur in



COMMON MICE
Photo: John Kearton

such numbers as to do serious damage both to food and to woodwork of houses.

Mice belong to the same family as rats, from which they are distinguished by their smaller size. They have large ears and long whiskers, and in colour are generally grey.

The field mouse, or wood mouse, and the harvest mouse live outdoors, or in barns or

granaries. Hawks, owls, and snakes are their natural enemies, and where these latter are exterminated, the mice, multiplying rapidly, soon cause much damage to grain in the fields. The jumping mouse (jerboa) and



LONG-TAILED FIELD-MOUSE
Photo: John Kearton

some other outdoor animals called mice are of different families. See RAT; VOLE.

Scientific Names. The mouse family is called *Muridae* by scientists. The domestic mouse is *Mus musculus*; the wood or field mouse, *Mus sylvaticus*.

MOUSSORGSKY, mu sorg' ski, MODEST PETROVITCH (1839-1881). Russian composer; one of Balakirev's disciples, whose influence on Russian music was so decisive at a period when Germanic influences were being discarded in favour of a highly national and characteristic Russian style. Moussorgsky began life in the army, but gave himself more and more to composing. A slow worker, many of his musical undertakings were left unfinished, but his greatest work, the opera *Boris Godounov* (1874), and his numerous songs, secured him a profound influence on the course of Russian music and of the modern schools at large. His second opera, *Khovanschina*, though less well known, has many passages of great beauty.

Like many of the younger Russian composers, Moussorgsky was an amateur in music, and such technical skill as he acquired was won in the throes of actual composition. *Boris Godounov*, great though it is in a powerful and original manner, is strikingly uneven in quality. The score was much worked upon by his friend Rimsky-Korsakov, and this more finished version is usually presented in preference to the original score.

MOUTH. In man and in the majority of animals, the mouth is bounded by the jaws; these contain two sets of teeth, an upper and a lower. Within the walls of the mouth are situated glands which secrete saliva. This fluid is mixed with our food as we chew it, and it helps in digestion. The top of the mouth, popularly known as its "roof," consists of a front bony portion called the *hard palate*, and behind this, a soft part called the *soft palate*. The former serves as

a partition between the mouth and the nose, and the latter, which arches down at the back of the mouth, forms a curtain between the mouth and the pharynx. The pharynx is a funnel-shaped sac which connects with the gullet, or oesophagus. Hanging down and slightly to the rear is a small cone-shaped prolongation of the soft palate, known as the *uvula*. Extending from the floor of the mouth is a flexible bundle of muscles, the tongue. In addition to its usefulness as a muscular organ, it is the seat of the organs of taste, one of the five special senses. The entire mouth cavity is lined with mucous membrane. See PALATE.

Breathing should not normally take place through the mouth, but the nose. Inability to do this comes from some unhealthy condition of the nose or throat, which ought to be corrected.

MOUTH-ORGAN. See HARMONICA

MOWING MACHINE. Machine for cutting grass or hay, as opposed to a reaper for cutting corn. The principal difference between a mower and a reaper is that the mower merely cuts the crop, while the reaper cuts it, sweeps it up in bundles, and may also bind it into sheaves. The most familiar form of mower is the lawn mower used in a garden. This was invented in 1830 by Edwin Budding, and its manufacture was begun two years later by the firm of Ransome. In general principle the first lawn mower hardly differed from the present type. The blades, arranged on a curve round a cylindrical frame, worked, as they do still, against a straight knife bar. The drive was through geared wheels worked off a clutch from the hub of the roller. There was no roller in front of the blades, but a box to catch the cut grass was present. The modern mower is merely a neater, far lighter and more compact evolution of the same design. For large lawns, the mower is often driven by a small motor.

The large hay-cutting mower has reciprocating blades, moving between fingers attached to the knife bar. These blades, which are all part of one long knife-blade, are driven by a connecting rod and gear from the wheels. This type of mower was evolved early in the twentieth century.

MOZAMBIQUE, *mo zam beek'*. (PORTUGUESE E. AFRICA). Colonial possession of Portugal on the east coast of South Africa. It covers an area of 299,973 square miles and has a population of 4,028,764, of whom 35,018 are Europeans.

Besides the territory directly administered by the Portuguese Government, comprising 245,776 square miles, there is the territory of Manica and Sofala of 51,881 square miles, under the supervision of the Mozambique

Company. Until 1929, when its contract expired, the Nyasa Company supervised territory which is now included in that controlled by the state.

Since 1498, when Vasco da Gama landed at one of the mouths of the Zambezi, Portugal has owned this country. During the sixteenth century, settlements were made along the coast, and in 1632 a military post was set up at Tété, on the Zambezi. It was 1912 before Portugal was able to exercise adequate control over the more remote parts. In 1914 partial autonomy was granted the province. In the same year, the Nyasa Company came under the control of German capitalists, who remained the dominant economic force until the World War. By the Treaty of Versailles, 1919, the territory south of the Rovuma River was allotted to Portugal. This region, known as the "Kionga Triangle," had formerly been part of German East Africa.

Most of the land is low-lying and has a tropical climate, with a wet warm season and a cooler dry season. The navigable Lower Zambezi crosses the north of the country.

The native negroes are a peaceful people, generally engaged in growing maize, sugar cane, tobacco, cotton and coffee. Their treatment at the hands of foreign commercial interests has often been ruthless, and a virtual system of slavery existed in many places. In the district of Mozambique, the practice of compulsory unpaid labour was not abolished until 1925. The Government has made much progress in the improvement of conditions. Finances have been put on a sound basis under the Salazar regime.

Where capital has been available, the economic progress of the territory has been rapid. Several hundred miles of railway have been completed, and more is under construction. The chief exports are sugar, tobacco, raw cotton, wax, copra, rubber, nuts, corn, gold and silver ores, and ivory. Coal occurs near Tété.

Beira (population 23,694) is the seat of administration of the Mozambique Company and the chief port, with rail communication with Rhodesia and South Africa. Connection is being developed with Benguela on the Atlantic by the existing line from Angola, running through Belgian and British territory. The two-mile-long Zambezi bridge was opened in January, 1935.

Lourenço Marques (population 43,000), on Delagoa Bay, has a better harbour and good railway communication and exports Transvaal coal. It is the colony's capital.

Other important towns are Mozambique, Quelimane and Sofala.

MOZART, *mo'zart* (in German, *mo'lsart*), JOHANN CHRYSOSTOMUS WOLFGANG

AMADEUS (1756-1791). A German musician, born at Salzburg. At the age of two he showed such interest in the music lessons which his father was giving the daughter, Nannerl, that the ambitious parent began to teach him also, and at the age of three the boy was receiving a daily lesson an hour long. At five years of age he was composing short pieces for the harpsichord, and at six played before the elector of Munich and the Empress Maria Theresa of Austria.

In the following years Mozart travelled widely over Europe under the care of his devoted father. His success as a child prodigy was everywhere of the most remarkable kind. His early compositions, his playing, and his



MOZART
Photo Brown Bros

improvisation, met alike with an extreme enthusiasm and admiration. On his return to Salzburg he entered the service of the Archbishop. At the age of twenty-one, his mastery of the art of music was complete and his output already great. He decided to tour Europe again on his own account. But the reception which had carried him so far as a child wonder was no longer

accorded him as a grown man. The remainder of his life was a long struggle with poverty and discouragement. It is a remarkable fact that the serenity and creativeness of his talent should have been so little ruffled in face of the distractions of so chequered a career.

At twenty-six years of age he fell in love with Constanza Weber in Vienna, and in spite of some parental forebodings, married her in August, 1782. His wife proved fond, but of poor health and still poorer domestic ability. The household was constantly in disorder and debt, and still no regular post came to the harassed composer. For nine years he worked without ceasing, giving concerts, taking pupils for the sake of small sums of money, and composing with a rapidity that is almost unbelievable. The operas, *Figaro*, *Don Giovanni*, and *The Magic Flute* all met with great popular success, but still money was scarce and hard to come by. The three greatest symphonies, in E flat, G minor and C major, were all composed within six weeks in the summer of 1788. But at the age of 35 Mozart was a sick man. In July, 1791, a mysterious stranger

commissioned him under a pledge of secrecy to write a Requiem for an unknown nobleman. So ill was Mozart that he came to think it would be the Requiem for his own death. He did not live to finish it, dying of malignant typhus fever on 5th December, 1791.

Mozart's compositions are brilliantly characteristic of the age in which he lived. Their most obvious elements are a sparkling charm and a suavity of thought, but by the sheer pellucid loveliness of its themes and the purity of its style, his music at its best (in his operas, for example, and most of all in his string quartets) takes its place among the great compositions.

MUCILAGE, *mū' sil ayj*. An adhesive, formed by dissolving gum arabic (which see) or other gums in a solvent. Gum-arabic mucilage is a solution of the gum in hot water. Aluminium sulphate may be added to make an adhesive capable of causing paper to stick to glass; glycerine or sugar will also keep the mucilage from drying too hard. Dextrin dissolved in cold water makes a mucilage suitable for the backs of postage stamps. Glue and gelatine are also used to make mucilages, but these require the addition of vinegar, glycerine, or nitric or other acid in order to remain in the fluid state.

MUCUS, *mū' hūs*. The nose, mouth and other body cavities communicating with the outside are lined with membranes that are kept moist and protected from irritation by a clear, sticky fluid called *mucus*. This fluid, which is produced by cells in the mucous membranes, forms a layer of varying thickness on their surfaces. In the gullet the mucus enables the masticated food to slip down easily into the stomach. Minute particles of dust breathed into the nose are washed down into the throat by the mucus, and so are kept from passing to the lungs. When disease germs are being carried away by the mucus it becomes thick and yellowish, and is secreted in larger quantities. This condition is due to infection of the membrane, and is known as a "cold." See **CORYZA**; **MEMBRANES**.

MUEZZIN, *mū ez' in*. See **MINARET**.

MUKDEN, *mook' den*. The old capital of Manchuria (which see). For the battle in 1905, see **RUSO-JAPANESE WAR**.

MULATTO, *mū lat' o*. A person of mixed race, having white and negro blood in about equal proportions. Mulattoes are called half-breeds, and in appearance vary from light to dark, according to the proportions of white and negro blood.

In Mexico, Central and South America, a person of mixed white and Indian or negro blood is called *mesizo* or *ladino*.

MULBERRY. The mulberry family includes several species of trees, but the best-known is the tree whose leaves provide food



MULBERRY

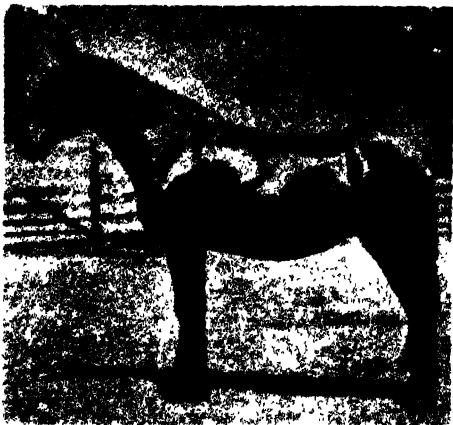
for the silkworm. The caterpillar of the silk moth, after feeding voraciously on mulberry leaves, spins a cocoon of fine, silky fibres, which later are woven into lustrous fabrics. The *white mulberry*, so called from the colour of its fruits, has been cultivated from earliest times in China for the purpose referred to above. In Britain the

dark fruits of the scrub-like *black mulberry* are used as dessert and in preserving and wine-making.

Scientific Names. The mulberries proper belong to the genus *Morus*, family *Moraceae*. The family includes such plants as the India-rubber tree, the hop, hemp and breadfruit. The white mulberry now cultivated for the silk industry is *Morus alba*, variety *multicaulis*. The black mulberry is *M. nigra*.

MULE. A domestic animal, the offspring of the male ass and the mare.

Mules inherit from their sires the ability to conserve their energies when forced to work



hard and for a long time, and they are therefore less likely to suffer from overwork than horses. Mules exhibit characteristics of

both parents. From the sire a mule inherits its long ears, short mane, scant tail, and small feet. Considerable muscular development, a well-shaped body, and size come from the dam. The sire bequeaths the braying voice and the endurance; the dam, ease in getting accustomed to harness.

Though capable of bearing hardships with fortitude, mules respond to kind treatment, and when properly managed, they will do as much work as horses.

MULE DEER. A beautiful North American deer, so called because of its very large, furry ears. This deer is about 3 ft. 4 in. high at the shoulder, and has a dull yellowish coat in summer and one of bluish-grey in winter. Its antlers are magnificent. It has a peculiar stiff-legged gait, but bounds over the roughest trails with great swiftness. See **DEER**.

Scientific Name. The mule deer belongs to the family *Cervidae*. Its specific name is *Odocoileus hemionus*.

MULLEIN, mul' in. There are over 100 species of this hardy herbaceous or subshrubby plant, nearly all bearing yellow

flowers resembling hollyhocks. Perennial species are easily cultivated in any ordinary garden soil and can be grown either from seed, cuttings or by the division of rootstocks. The *phoeniceum* variety, one of the few that bears a white flower, is popular. *Chaixii* is a biennial, flowering from June to September, growing a yard high. Another biennial is *nigrum*, the bright yellow flowers of which grow in dense tufts on long spikes. The Great Mullein grows as high as 5 ft., bearing large flannel-like leaves running down the stem. The yellow flowers are borne in dense club-shaped spikes. Great Mullein flowers are sometimes used as a tea. The leaves of many of the mullein species are covered with a hair structure to prevent excessive transpiration.



MULLEIN

Scientific Names. The mullein species are known as *Verbascum* and the Great Mullein as *V. thapsus*.

MÜLLER, *mül' er*, FRIEDRICH MAX (1823-1900). A German Orientalist, student of languages and writer, commonly known as

MAX MÜLLER. He was born at Dessau, the son of the poet Wilhelm Müller. In 1836 he went to Leipzig, where he began the study of Sanskrit. In 1846 Müller began editing the *Rig Veda*, the great Hindu classic (see *VEDAS*) in England, and in 1848 the first volume of the work was printed by the Oxford University Press, at the expense of the East



MAX MÜLLER
Photo: Brown Bros.

India Company. In 1850 he was appointed professor of modern languages at Oxford.

Müller retained his professorship until 1876, when he resigned in order to take up the editing of *The Sacred Books of the East*. During the rest of his life, he was actively engaged in lecturing and writing.

MULLET. There are two families of salt-water fish that bear this name. *Grey mullets* are stout-bodied fish of a bluish-silvery colour. They are from 1 ft. to 2 ft. long, and have a blunt head and small mouth, in which the teeth, if present, are very weak. These fish are found in great numbers close to shore in nearly all temperate and tropical waters.



MULLET
Photo: Weller

Their flesh is wholesome and well flavoured. *Botargo*, prepared from the roe of the mullet, is a favourite relish in Spain and also in Italy, where it is called *botarcha*.

The *red mullets* are small, brightly-coloured fish, found chiefly in the warm seas. They were considered a great delicacy by the Romans. These fish also have a small mouth and feeble teeth. They are distinguishable by two long barbels which hang from the chin.

Scientific Names. The grey mullets comprise the family *Mugilidae*. The common mullet is *Mugil capito*. Red mullets comprise the family *Mullidae*. The European species is *Mullus barbatus*.

MULLINGAR'. County town and principal market town of County Westmeath, Ireland (population 5500), served by the Great Southern Railway, fifty-one miles from Dublin. The town's only industries are those connected with agriculture, but the fairs and markets are of first importance and attract the rural population of the greater part of the county.

MULLION. In architecture, the vertical division between the lights of a window. The form of the mullions is often characteristic of a period. In Early English architecture they are often only the divisions, massively constructed, between separate lancet windows; or a window may be divided into two or three lights by pillared mullions; and they are usually plain or fluted. In the large composite windows of the Decorated and Perpendicular styles they are slender stone shafts, frequently adorned with carvings.

MULTIGRAPH, *mul' te graf*. A device for printing letters and other documents, so that they resemble typewritten copies. The multigraph consists of a hollow steel cylinder mounted on a horizontal axis, and with parallel grooves on the surface for holding the type. The cylinder is divided into two sections, one of which revolves. The grooves in the sections are alike. Each groove in the stationary section contains all the type of the same letter, one groove containing the a's, another the b's, and so on, the capitals being in one groove and the small letters in another. The set of type, or fount, contains all the letters, figures, spaces, and marks of punctuation necessary to set up matter that will fill one page of letter paper.

The operator sets the type by bringing the groove in the movable section of the cylinder opposite the groove containing the desired letter and sliding the type into place. A bedplate, or *platen*, under the cylinder is so adjusted that it presses the paper against an inked ribbon that covers the type as the cylinder is rotated. The paper is fed to the machine as the cylinder revolves, and with an electric motor for power, 5000 or more copies can be printed in an hour. Machines operated by hand turn out about 1500 an hour.

MULTIPLE, **LEAST COMMON**. See **LEAST COMMON MULTIPLE**.

MULTIPLICATION. The process of using a number as many times as is indicated by the number of units in another number. See **ARITHMETIC**.

MUMMING. A term often applied to acting, but more strictly referring to traditional presentations which still survive in some rural districts of Britain from the medieval festivities associated with the great religious festivals. At Christmastide



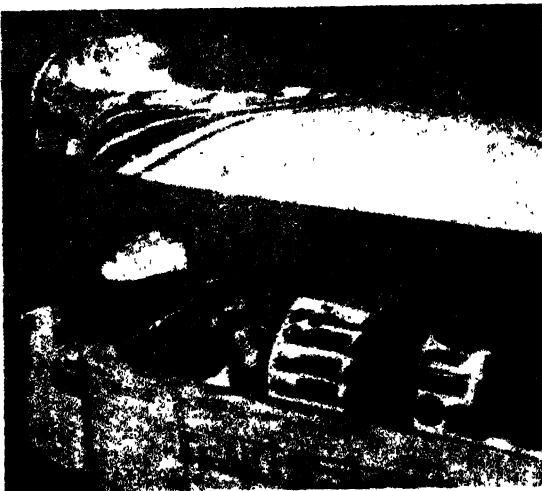
MUMMERS AT OVERTON, HAMPSHIRE
Photo: Photopress

mumming takes on the character of mock serenading, strange masks and headdresses being worn.

MUMMY. An embalmed body, preserved by the process used by the ancient Egyptians when preparing their dead for burial. Embalmers were employed in various capacities to operate upon the bodies of the rich. The brain and bowels were removed, and the body was steeped for many days in a solution of natron (sodium carbonate). It was then desiccated, and, after other processes, each member of the body was wrapped separately in linen. The head received special attention, the face being sometimes covered with a gilded mask. The bodies of the poorer classes were embalmed in a more rough-and-ready fashion and wrapped in coarse cloths.



EGYPTIAN MUMMIES X-RAYED
These photographs show that the children suffered from curvature of the spine
Photo: U & U.



EGYPTIAN MUMMY
Photo: U. & U.

MUMPS. A contagious disease that occurs (with few exceptions) at any age except babyhood and old age. It is manifested principally by swelling of the gland below and in front of the ear. About one to two weeks elapse after exposure to contagion, and then a pain is felt below and in front of the ear; there is also difficulty in swallowing. Swelling, either on one or both sides of the face, comes on rapidly, so much so as to make it difficult to open the mouth or to chew. The swelling begins to subside at the end of four or five days, and if both sides of the throat have been affected, the patient never has a second attack. Warmth applied to the swelling, and medicine to relieve fever, are measures generally prescribed. Epidemics of mumps sometimes occur.

MÜNCHHAUSEN, *mūnK' how zen*, VON, HIERONYMUS KARL FRIEDRICH, BARON (1720-1797). A German soldier and cavalry officer. When he retired in 1760 and went to live on his estate at Bodenwerder, he used to amuse himself and his friends by ridiculously exaggerated accounts of his valour as a soldier and his extraordinary adventures and exploits. His stories were widely enjoyed, and Rudolph Erich Raspe, a German exile living in London, gathered the tales and published the first English edition in 1785, naming it *Baron Munchausen's Narratives of His Marvellous Travels and Campaigns in Russia*.

The work went through several editions, and suffered many changes and additions at the hands of publishers. One edition, published in 1793, has the sub-title, *Or the Vice of Lying Properly Exposed*. Researches have shown that Raspe borrowed from other gifted liars to add zest to his book, and tales from Bebel's *Facetiae* and Lange's *Deliciae* are incorporated in his work. The usual English spelling of the name is *Munchausen*.

MUNICH, *mu'nik*, in German MÜNCHEN, *mūn' Ken*. The capital of Bavaria and one of the leading centres of art, music and education in Germany. It is situated on a broad plateau about 1700 ft. above sea level, on the southern bank of the River Isar, and is about 40 miles from the Austrian frontier.

The most imposing of the many buildings which house fine collections of art is the Old Pinakothek, containing paintings by old masters, as well as engravings and drawings and a priceless collection of antique vases. The New Pinakothek is celebrated for the great frescoes representing the development of art; and it contains a vast collection of paintings by modern artists. The Glyptothek is devoted to sculpture, ancient and modern. The Bavarian National Museum, the Royal Library, the former Royal Palace are other famous buildings. Connected with the Palace are the Court Church and the Court and National Theatre. The Cathedral dates back to the latter half of the fifteenth century.

Munich is the seat of a university. It also possesses a wide variety of other schools, including a world-famous college of music. Industrially, the city is known for its stained-glass works, iron and brass foundries, lithographing and engraving works, and factories for the production of optical and

mathematical instruments. Famous, too are the vast breweries for the manufacture of Bavarian beer. The Brown House in Munich was the original home of the Nazi movement. The city has a population of 735,685 (1933).

MUNICIPAL, *mū nis' ip al*, **GOVERNMENT**. See **BOROUGH**; **CITY**; **COUNTY BOROUGH**; **LOCAL GOVERNMENT**.

MUNICIPAL OWNERSHIP. The term signifies ownership and operation by a local government unit of such public necessities or conveniences as waterworks, lighting systems, street transport undertakings, and the like, as opposed to private control of these utilities. There are instances in which owner-



MUNICH

The twin towers of the Cathedral are seen in the background.

Photo: German State Railways

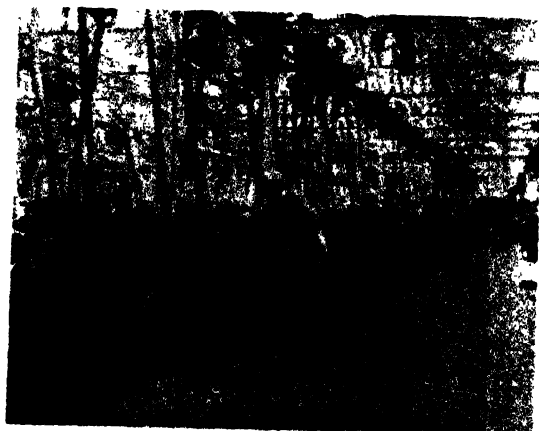
ship and operation are not combined; the corporation, as owner, may lease operating privileges to private companies, under such rentals and restrictions as may be agreed upon.

The economic principle of publicly owned companies has been debated for many years.

One electricity supply system; one gas plant; one system for supplying water—a single organization to control each of these necessities has come to be the rule in most

areas. Service to the whole public in any line is regarded as a natural monopoly; there should not be competing companies. As an illustration, one gas undertaking in a town is a necessity; two competing companies invite confusion, are vexatious, and neither can fully serve the public. These things, which are natural monopolies, if left under private ownership are sometimes difficult to control in the interests of all the people. Ownership and operation by the local authority place the public in command of its utilities; the vote of the people, or their representatives, determines the extent of service, its quality and cost. If affairs are wisely conducted, the cost may be less than under private ownership, for the local authority does not aim at returns larger than necessary to cover depreciation.

On the other hand, there are local undertakings which may be a charge on the rates; for example, housing schemes, public baths,



MUNITION FACTORY

A photograph taken during the World War.

Photo: Topical

tennis courts, bowling greens, etc. Opponents of municipal trading claim various disadvantages. They allege that there is a possibility of corruption in administration; that experienced officials may be able to render themselves immune from the attacks of the ratepayers, who are ignorant of the technicalities involved. It is claimed, too, that local councils should be administrators and not public traders; that interference in work which they do not understand detracts from their efficiency in performing the duties for which they were elected. It is held that a publicly owned undertaking might prove less efficient and more costly than private enterprise. Finally, there is the general objection—if, as shown above, not always a valid one—to a monopoly.

In England and Wales, municipal trading may be undertaken under general Acts of Parliament, as in the case of the provision of markets, water supply, gas supply, electric supply, tramways, etc. But a private Act must be passed to confer powers on a local authority not generally provided for; for example, a Municipal Savings Bank requires a private Act for its inception. Many towns throughout Great Britain are showing their enterprise in establishing municipal airports to cope with the latest form of travel.

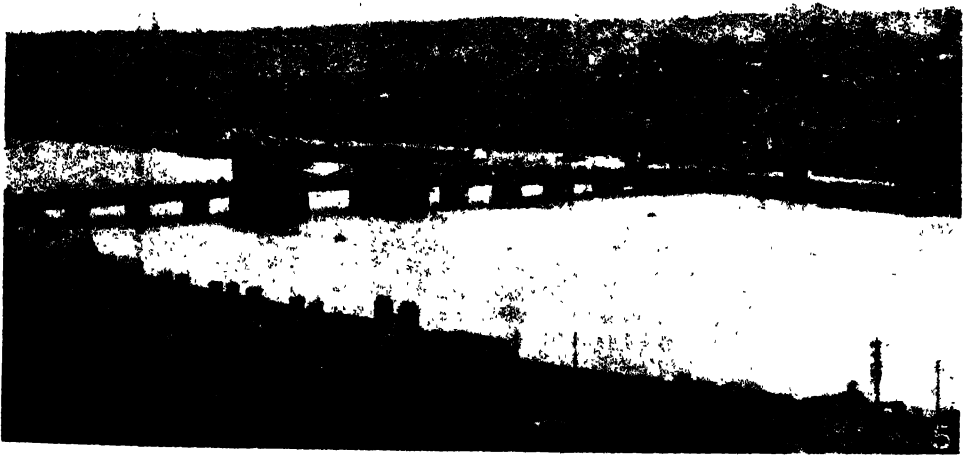
By far the greater number of water systems in Canada are owned by the people, and in both Canada and Great Britain, the theory of municipal ownership has wider acceptance than in the United States.

MUNITIONS, *mū nish' ōns*. All kinds of material and stores for the prosecution of war, such as weapons, wire, ammunition, explosives, vehicles, clothing, camouflage material, and so on. During the early days of the World War, no organization existed for ensuring that adequate reserves were formed and maintained, and that one Service was not receiving too large a proportion at the expense of the others. To ensure, as far as possible, the co-ordination in the organization of industry of the conflicting demands of supply and really urgent demand, a Ministry of Munitions was formed. The functions of this Ministry were to increase production, to distribute orders between manufacturing firms so as to keep all working at full pressure, and, in case of a shortage, to decide the relative urgency of conflicting demands. These functions are now performed by a department of the Committee of Imperial Defence, known as the Supply Committee, and arrangements for increased output of munitions in

time of war are fully organized in time of peace. A Director-General of Munitions was appointed in July, 1936. The responsible Cabinet Minister is the Co-ordinating Minister of Defence.

MUNKACSY, *moon' kah che*, *MUNÁLY* (1844-1900). A Hungarian painter, whose real name was MICHAEL LIEB. His works have great dramatic power, but have not maintained the reputation they had during his lifetime. His best works are "Milton Dictating *Paradise Lost* to His Daughters" and "Christ Before Pilate."

MUNSTER. The largest of the four provinces of Ireland, comprising the counties of Clare, Kerry, Limerick, Cork, Tipperary and Waterford. The whole of Munster is included in the Irish Free State, and it has



MUNSTER

1. The "Cross of Cashel," once the coronation stone of the kings of Munster. 2. The Glen of Aberlow, Co. Tipperary. 3. Killarney's lakes at sunset. 4. West Gate, Clonmel. 5. Waterford from Mount Misery.

Photos: Irish Tourist Association

a population of 971,032 and an area of 5,962,803 acres.

Physical Features. With the exception of County Clare (a later addition to the province), the whole of Munster lies to the south of the Shannon, which forms its natural northern boundary. From the Slieve Aughty Mountains, overlooking Lough Derg, County Clare descends in a series of bare limestone hills to the coastal lowlands. South of the river the coastal plain continues, taking up a large part of County Limerick, until toward the south-east it narrows into the Golden Vale of County Tipperary, hemmed in by high mountain barriers to the north and south—on the north, the Silvermine Mountains, with Keeper Hill (2278 ft.) and the Devil's Bit, in the south the parallel ranges of the Galtees and Knockmeal-down Mountains. In the north of Tipperary, beyond the mountain barriers and alongside Lough Derg, lies the fertile plain of Ormonde. In the Golden Vale, the Rock of Cashel rises from level pastures, its summit crowded with historic ruins, while further to the south-east Slievenaman towers abruptly out of the plain. Southward of this lies a solid mountain barrier, the Galtees in the west, with Galteemore (3015 ft.), and at its foot the beautiful Glen of Aherlow, 8 miles long, the only pass between Counties Cork and Tipperary. Near by are the Mitchelstown Caves, a series of eroded limestone caverns. To the south of the Galtees rises the brown ridge of the Knockmeal-down Mountains (2609 ft.), merging toward the east in the Comeraghs (2579 ft.), which on their northern side slope down to the River Suir, as it flows along the boundary of Counties Waterford, Tipperary and Kilkenny to meet the Nore and the Barrow above the head of Waterford Harbour.

Of the south-western counties, Cork has a splendid coast-line, rugged and bold all the way. Toward the west it is more broken, until in the extreme south-west it becomes a series of huge, jagged promontories enclosing deep inlets of the sea, the series continuing up the seaboard of Kerry. Grandest of all, perhaps, is Bantry Bay, with Glengarriff at its head. Inland, County Cork is crossed from west to east by three parallel rivers, the Bandon, the Lee and the Blackwater, all flowing down from the highlands of Kerry. Beyond the watershed lies the lakeland of Killarney, by general consent the most beautiful region of all Ireland. West of Lough Leane, the chief of the lakes, is a wild and narrow gorge, the Gap of Dunloe, and south of this the famous MacGillicuddy's Reeks, topped by the giant Carrantuibhinn (3414 ft.), highest mountain in Ireland. Though generally awarded the

palm of beauty, Killarney is not without a rival. Some have even preferred the Dingle Peninsula, with its hills clad with heather and moss, stretching out between arms of the sea to where Brandon Mountain (3127 ft.) falls sheer away to the ocean.

History. The early history of Munster and of its rulers, the Eoghanacts, is shrouded in obscurity. The Eoghanacts were said to have come from France and to have conquered the county and settled there. Whatever their origin, they dominated Munster (then a smaller territory than the present province) for some centuries until their power was weakened by the increasing pressure of Danish invasion. The Norse sea-rovers founded or colonized several of the most important towns, including Cork, Waterford, Limerick and Carrick, and the country remained under their domination until near the end of the tenth century. Brian Boru, a young prince of Clare, drove them from Limerick and founded the kingdom of Thomond (North Munster), and then, in an astonishing career of conquest, carried his victorious arms from the west coast to the east, to become High King of Ireland. The empire which Brian acquired soon broke up with his death, but Thomond and its O'Brien kings remained. When Strongbow came over with his Norman army he met his first serious reverse at Thurles, in County Tipperary. Later on, the O'Briens abandoned Thomond to the Normans, retiring across the Shannon to County Clare, where they ruled as kings until Tudor times, and Munster was parcelled out between two great Norman houses, the southern branch of the Fitzgeralds, Earls of Desmond, and the Butlers, Earls and later Dukes of Ormonde. The Desmonds later fell foul of Queen Elizabeth, rebelled and were broken. The Butlers survived until 1715, when they too fell from favour for supporting the Stuart cause. In the seventeenth century, Ireland suffered many hardships for its attachment to the Stuarts, and Munster bore its full share of the burden. Limerick and Clonmel were besieged by Cromwell's troops; Cork fell before the Duke of Marlborough. In the next century Munster increased greatly in prosperity and became a large exporter of grain; but the disastrous famine of 1845-47 and the repeal of the Corn Laws started a decline from which the province is only now beginning to recover. Much is expected from the Shannon Hydro-Electric Scheme, begun in 1925, and completed in 1929.

Agriculture and Industries. Over half the working population of Munster is engaged in agriculture. The most fertile areas are the plains of Tipperary and Limerick; indeed

Tipperary is the best horse- and cattle-raising county in Ireland. In the south-west of County Cork there are mines of some importance, containing copper and manganese ore; there are also considerable slate-quarries in the same area. There is excellent salmon fishing in the numerous rivers of the province, and herring fishing off the coast, especially near Kinsale, County Cork. The manufacturing industries are mainly concentrated in the few large towns—wool mills, breweries, distilleries, boot and shoe factories and motor works at Cork, bacon-curing, boots and shoes, and margarine at Waterford, lace-making and grain-milling at Limerick. A few smaller towns have local industries worthy of mention, especially Youghal (County Cork) with its famous Irish Point lace, Blarney with its tweed, and Castleconnell with its fishing-rods. New industries are represented by a beet-sugar factory at Mal-low, and a meat-canning factory at Roscrea.

Principal Towns. Articles on Cork, Waterford, Limerick and Tralee will be found elsewhere in this work.

Clonmel (population 8989). The capital of County Tipperary, situated on the River Suir, in the fertile and beautiful Golden Vale. Clonmel is an ancient city and was formerly the principal seat of the Butlers of Ormonde. Laurence Sterne, the novelist, was born here in 1713. At the present day Clonmel is best known for its salmon fishing, and for the great horse and cattle show held here each July, second only to the Dublin show.

Cobh, kôb (pop 7070). Formerly Queens-town, the seaport adjoining the city of Cork. Cobh ("Cove of Cork") was a village until the Napoleonic Wars, when it was enlarged as a naval station. It is now a regular port of call for transatlantic liners.

MUNTZ METAL.
See BRASS.

MURAT, mú rah',
JOACHIM (1767-1815). A French marshal and cavalry leader. After enlisting in a cavalry regiment, he attached himself to Napoleon, and in 1795 followed him to Egypt and Italy. His rise was rapid. In 1799, he was appointed general of division

and commander of the consular guard. In 1800 he married Caroline, the youngest sister of Napoleon, and in 1804 became governor of Paris. On the establishment of the empire, he was made marshal. In 1808 Napoleon placed Murat at the head of the army in Spain, and in the same year had him proclaimed king of Naples, under the name of Joachim I. He declared war on Austria after Napoleon's escape from Elba, but was defeated at Tolentino, and after the Battle of Waterloo, he fled to Corsica. Later, Murat made a foolhardy attempt to recover the kingdom of Naples, for which he was tried by a court-martial and shot. See NAPOLEON I.

MURCIA, mur' shia. See SPAIN.

MURDER. Originally meaning a secret killing, murder (derived from Old Eng. *morh*, "secret") is defined according to English Law as "unlawfully killing a reasonable creature, who is in being and under the King's peace, with malice aforethought either express or implied, the death following within a year and a day." This definition is archaic and technical and needs explanation. The word "unlawfully" distinguishes both murder and manslaughter from non-felonious homicides, e.g. killing in self-defence or by pure accident. The "killing" need not be by direct physical violence. A "reasonable creature" means simply a human being; a lunatic is a reasonable creature under this definition. "In being"—it is not murder to kill an unborn child, but procuring abortion, concealment of birth, and infanticide are all separate crimes (see INFANTICIDE). "Under the King's peace" means practically nothing nowadays, for even a savage or a condemned criminal is under the King's peace, and an alien enemy can be lawfully killed only in the course of warfare. The words "with malice aforethought" distinguish murder from manslaughter. In early English law all unlawful homicide was a felony and therefore punishable with death, but the accused could often, as in other felonies, escape death by claiming benefit of clergy. By the time of Henry VIII, it was settled that there should be no benefit of clergy for "murder with malice aforethought." The phrase is an ancient one and has acquired a very technical meaning. The word "aforethought" does not mean premeditated, but simply *deliberate* or *intentional*. It is not necessary that the intention should be to kill; an intention to do any act likely to cause death may be sufficient, even though there is no intention of hurting anyone thereby. Old writers say also that to kill, even accidentally, in the course of committing a felony or while resisting a police officer amounts to murder, but this is doubtful, though the unintentional causing of death in committing a felony involving violence to the person, e.g. rape, is murder. Gross provocation may reduce murder to manslaughter (see MANSLAUGHTER). The



MURAT
Photo: Brown Bros.

and commander of the consular guard. In 1800 he married Caroline, the youngest sister of Napoleon, and in 1804 became governor of Paris. On the establishment of the empire,

rule that death must follow within a year and a day is due to the difficulty in the early days of medicine of proving the connection between an act of violence and a death long afterward.

The penalty for murder is death, and no lesser sentence can be imposed. But a death sentence may be remitted or commuted to one of penal servitude by the King, on the advice of the Home Secretary. In the law of some countries several degrees of murder are distinguished, and only murder in the first degree, where there is an intention to kill, is punishable with death; this distinction is unknown to English law. Both murder and manslaughter debar the killer from receiving any benefit under the victim's will, and probably also from inheriting under the victim's intestacy.

Attempted murder is a felony punishable with penal servitude for life, and conspiracy to murder, though only a misdemeanour, is punishable with ten years penal servitude. See also HOMICIDE; MANSLAUGHTER.

MURIATIC ACID. See HYDROGEN CHLORIDE.

MURILLO, BARTOLOMÉ ESTEBAN (1617-1682). One of the foremost artists of the Spanish school. He was born in Seville of



MURILLO

Photo: Brown Bros.

humble parents. He began his life work by painting religious pictures for the fairs of Seville, and later executed commissions for the South American trade. Then he started on a long and tedious walk from Seville to Madrid, arriving there friendless and penniless. Velasquez, his townsman, at that time painter to the king, offered Murillo a

home and gave him permission to work in his studio.

His eleven large paintings for the Franciscan convent brought him immediate fame and many other commissions. He founded the Academy of Seville in 1660, and acted as its president the first year.

Murillo's masterpiece, the "Immaculate Conception," hangs in the Louvre. Among the eight famous paintings for the Church of St. George are "Moses Striking the Rock," "Abraham and the Angels," "The Miracle of the Loaves and Fishes," and "Saint Peter Released from Prison." "The Dice Players" is typical of his many famous representations of Spanish peasant life.

In 1681 Murillo went to Cadiz. While there he received injuries in a fall from scaffolding, which resulted in his death. He was buried in the Church of Santa Cruz, in Seville. 200 of his works are in England.

MURMANSK, moor mansk'. See RUSSIA.

MURRAY, JAMES (1719-1794). A British soldier and colonial administrator, the first British Governor of Canada. In 1759 he was one of the three brigadiers under Wolfe in the expedition against Quebec, and was a commander in the great battle on the Plains of Abraham.

In 1763 the king appointed General Murray Governor of Canada. As Governor, Murray was accused of favouritism toward the French. Accordingly, he was recalled to England in 1766, and was compelled to stand trial, but was completely exonerated of wrong-doing. From 1774 to 1781, he was Governor of Minorca, which he surrendered to a force of French and Spanish troops after a seven months siege.

MURRAY, LORD GEORGE (1694-1760). The fifth son of John, first Duke of Atholl, was one of the brilliant soldiers lost to Britain by the Hanoverian succession. He was with the Jacobites in 1715 and at Glenshiel in 1719, then made his peace with the government. He joined Prince Charles Edward in 1745 and became his commander-in-chief; unfortunately, his relations were bad with the Prince and worse with the Irish officers on whom the Prince relied. Murray was an admirable strategist. He won a clear road through northern England by making Wade expect his arrival on the east of the Pennines. He made Cumberland move too far westward, to block the way to Wales and so, by marching on Derby, put himself between Cumberland and London; it was declared that London must have fallen if he had continued. Compelled to retreat, he kept the Hanoverian troops at a respectful distance. The Prince had come by this to regard him on no very sufficient grounds as a traitor, and in the closing stages his advice was often neglected. He escaped abroad after Culloden.

MURRAY, SIR GEORGE GILBERT AIMÉ (b. 1866). English scholar; he was born in Sydney, New South Wales. Since 1906 Professor Murray has been Regius Professor of Greek at Oxford, but his interests have not been confined to Greek scholarships. His verse translations of the plays of Euripides give him a place as a poet of some note. Sir Gilbert has also taken an active part in international affairs, as a prominent supporter of the League of Nations. He has been Chairman of the League of Nations Union since 1923, and since 1928 President of the International Committee of Intellec-

tual Co-operation under the auspices of the League.

MURRAY, RIVER. The largest waterway in Australia, rising in the Australian Alps, near the eastern boundary of Victoria, and having a length of 1500 miles. With its two chief tributaries, the Murrumbidgee and the Darling, it drains nearly the entire south-eastern quarter of the continent. For about two-thirds of its course, it flows in a north-westerly direction, forming the boundary between Victoria and New South Wales. It then flows into South Australia, passes through the shallow Lake Alexandrina, and empties into the Indian Ocean through Encounter Bay. See AUSTRALIA; VICTORIA.

MUSCARI, *mus hair' i*. A hardy bulbous plant, also known as the grape hyacinth, belonging to the lily family. The flowers are in crowded clusters, egg-shaped and drooping, possessing a musk-like (or starchy) odour; bluish-purple, and having some resemblance to a bunch of grapes, they appear in May. The tissue at the base contains a sweet juice. The flower stems are 6 in. to 1 ft. high, leaves linear and flaccid. The muscari is not a common plant in this country, but is occasionally found growing in pastures and sandy places. The species with blue and with white flowers are often cultivated in gardens. *Muscari racemosum* has dark violet protogynous flowers.

MUSCAT, *mus kat'*, officially MASQAT, *mus kahl'*, on the Gulf of Oman. The capital of the independent state of Oman, in South-eastern Arabia. It is the only port of call in the sultanate. The inhabitants of Muscat carry on a prosperous trade in dates, mother-of-pearl, dry fish, and salt. Muscat and the nearby Matrah have a combined population of about 20,000. The British Government maintains relations with Oman through a political agent.

MUSCATEL'. (1) A kind of dried raisin. (2) A sweet wine, either red or white, made from the muscat grape in southern France and Italy.

MUSCLES. There are said to be over 660 muscles in the human body; they constitute about two-fifths of its weight. The muscles of the human body are its lean flesh; the muscles of cattle form the lean meat of beef, and those of a pig the lean meat of pork. There are two great classes of muscles, *voluntary* and *involuntary*. Intermediate between these is the heart muscle, which, though it acts like an involuntary

muscle, resembles a voluntary muscle in structure.

Voluntary Muscles. These are the muscles which move according to the will of a person



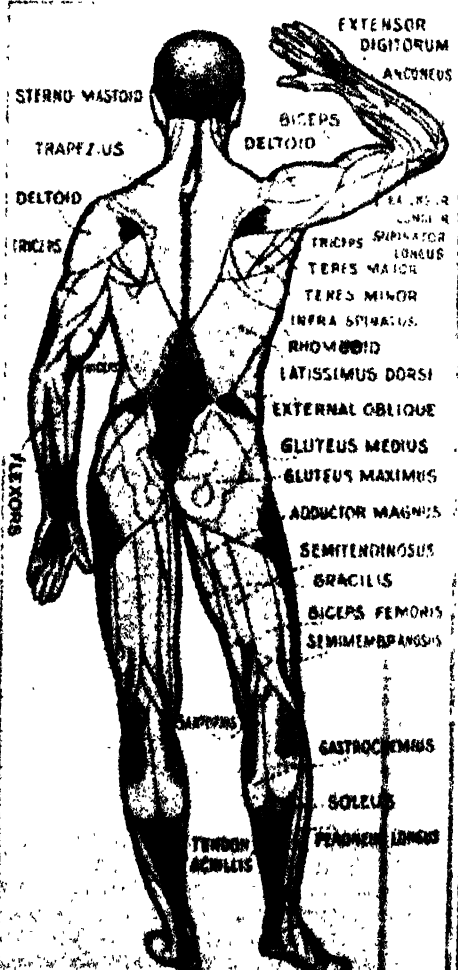
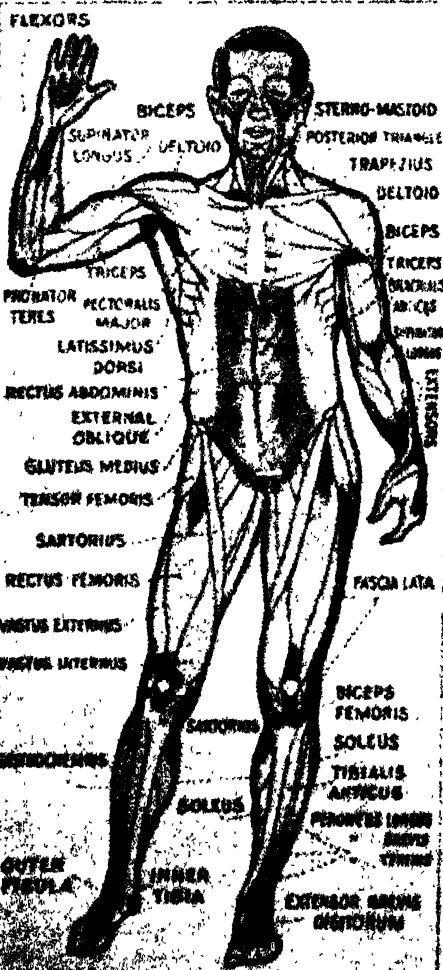
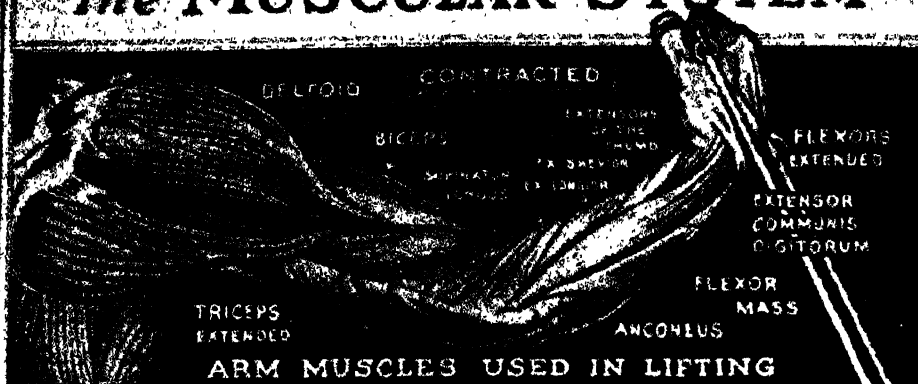
MURRAY RIVER

Photo: Australian Trade Publicity

and are under his direct control, as those used in walking. These muscles, for the most part, are placed next to the bones. In its typical form, such a muscle consists of a soft red middle portion which tapers toward each end; it is attached to some part of the bony framework by white, inelastic cords called *tendons* (which see). When the middle portion is stimulated through its nerves, it contracts, and in so doing, it exerts a pull on the tendons. This pull is then transmitted to the part to be moved. A muscle which has two divisions at one end is called a *biceps* muscle (two-headed), e.g. that in front of the arm between the shoulder and elbow. When the elbow is bent, this muscle swells and becomes thicker and harder. A *triceps* (three-headed) muscle, like that at the back of the upper arm, has three divisions.

According to structure, a voluntary muscle is made up of bundles of fibres about an inch long and about $\frac{1}{100}$ of an inch wide, each the development of a single cell. Under the microscope, these fibres are seen to be marked crosswise with fine alternating bands of dark and light. From this comes the name *striated* (striped) muscle, which is another term for voluntary muscle. The bundles of fibres are enclosed in an elastic sheet of thin membrane called the *sarcolemma*, a word meaning "rind" or "skin"; they are supported and protected by connective tissue, penetrated by nerves from the cerebro-spinal system, and supplied with blood vessels. Some voluntary muscles, such as those which are concerned in the process of

The MUSCULAR SYSTEM



breathing, are both voluntary and involuntary in respect to function. That is, breathing may be controlled by the will to a certain extent, but ordinarily it goes on mechanically.

Involuntary Muscles. The involuntary muscles are those whose contractions are beyond a person's control, and which lie in the walls of such organs of the body as the stomach, intestines, and arteries. They are said to be *unstriated*, for they lack the cross-bands characteristic of voluntary muscles. Involuntary muscles are made up of elongated, spindle-shaped cells, each of which tapers toward its ends and has a central nucleus. The cells vary in length from $\frac{1}{800}$ to $\frac{1}{100}$ of an inch, and are from $\frac{1}{800}$ to $\frac{1}{100}$ of an inch wide. These muscles also are penetrated by nerves from the sympathetic system. See NERVOUS SYSTEM.

Muscular Development. Weak, flabby muscles are an indication of physical inactivity, for muscles grow larger and stronger through use. Their systematic development stimulates the fundamental processes through which life is sustained—digestion, circulation, and breathing.

MUSCOVITE. A form of mica (which see).

MUSES. In ancient Greek mythology, the goddesses who presided over the arts and



APOLLO AND THE MUSES
Giulio Romano.

sciences. They were nine in number, the daughters of Zeus and Mnemosyne, the goddess of memory. Terpsichore and Thalia, muses respectively of the dance and of comedy, were merry of aspect, while Melpomene, the muse of tragedy, was of serious mien. At all the feasts of the gods on Olympus, the muses sang in chorus, often with Apollo, whose special attendants they were. The goddesses of other sciences and arts were Calliope, the muse of epic poetry; Euterpe, of lyric poetry; Erato, of love poetry; Polyhymnia, of sacred poetry; Clio, of history; and Urania, of astronomy.

In modern language the term *muse* is used generally to signify poetic inspiration.

MUSEUM. The word *museum* meant originally "a place to study," being derived from the Greek *mousetion*, "temple of the

Muses." The first use of the name was in connection with the Museum of Ptolemy Soter at Alexandria. In the beginning, only the higher branches of learning, such as art and philosophy, were represented in the museum, and it is only recently that specimens of natural history, geography, geology, etc., have been considered as properly belonging to these collections.

Probably churches and monasteries, in preserving objects of sacred interest, started the development of museums. Wealthy families through the ages satisfied their desire of possession by collecting beautiful paintings and curios, and often these accumulations formed the nucleus for famous museums of to-day. Thus the British Museum was started by Sir Hans Sloane, and Elias Ashmole's collection, begun in 1667, became the Ashmolean Museum at Oxford.

Some museums are devoted to pictures, to natural science, or to antiquities; some are universal in extent, as the British Museum (for which, see LONDON), while others are local.

MUSHROOMS. Flowerless plants belonging to the great fungus group. The mushroom proper, or fruit, seen above the ground, assumes a vast variety of shapes, from the ordinary toadstool to the less familiar coral-like formation. In colour, mushrooms range from pure white to delicate pastel shades of pink and lavender; from pale yellow to flaming orange and brilliant red; from dull grey to velvety brown.

A spell of wet weather in spring, summer or autumn always means a sudden increase in mushroom growth, for the plants require a great deal of moisture. It is the French word for "moss" that gives us the name *mushroom*, as well as the old-fashioned name *mushrump*.

Botanically, there is no distinction between mushrooms and toadstools, and although many kinds of mushrooms may be eaten with safety, there are others looking so much like them that only an expert botanist or a very careful observer can tell them apart, and which are poisonous; there are others that cause temporary illness.

Like other members of this class of filamentous organisms (see FUNGI), mushrooms lack the green colouring-matter called *chlorophyll*. Having no "leaf green," the mushroom lives by appropriating non-living organic matter; that is, food which has been prepared by some other living organism—actually, in the first place, by some green plant. Many mushrooms grow upon

old stumps or logs, upon decaying twigs or leaves, or even upon rich soil. Here and there may be found a species which lives on the trunks or branches of living trees. In the cases just mentioned, the growth of the *mycelium*, or vegetative stage of the fungus within the log or tree, causes it ultimately to decay or rot.

Commercially, mushrooms are grown in a specially prepared compost of well-fermented or cured stable manure. This compost is arranged on benches or in boxes, and when the temperature is favourable, pieces of



CULTIVATED MUSHROOMS
Photo: Sutton & Sons

mushroom spawn are inserted just below the surface of the compost and about one foot apart. This spawn consists really of the vegetative growth of the mushroom,

Under favourable conditions of temperature and moisture, the thread-like mushroom spawn grows out through the entire bed of compost, over which, meanwhile, there has been placed a layer of soil about an inch deep. In seven or eight weeks, mushrooms begin to appear on the surface.

As the young button enlarges, it will be seen that the upper portion, or cap, develops more rapidly; meanwhile, on the underside of this cap there are produced many thin plate-like structures called gills, radiating from a central stalk toward the periphery (edge) of the cap. As the cap enlarges and the stem lengthens, the veil covering the gills breaks away and the pink gill-bearing surface is exposed to view. The whole plant continues to enlarge and soon presents the appearance of an open umbrella, with the gills becoming brown-black at maturity.

It should be borne in mind that the table mushroom has no continuous covering membrane; consequently, it forms no cup, and the gills are invariably pink, changing to brown or brown-black. In all cases, spores are borne on the entire surface of the gills, and frequently, but not always, the spores in mass are of the general colour of the gills. As the mushroom ripens, the spores drop and are distributed by the wind and by grazing animals.

The Edible and Harmless Kinds. There are about 38,000 known species in the mushroom family. Among the thousand or more varieties that are good to eat, many are found among the group of *agarics*—a word that comes from the Latin *ager*, "a field," since all the mushrooms of this kind grow in pastures, lawns, and open grassy fields. The *common table mushroom* which is the only variety cultivated for the market on a large scale, belongs to this group. In France it is called a *champignon*, from the French *champ*, "field."

This variety never grows very large, its spores are brown, it has no cup, and its gills are a delicate pink when the plant is young, turning to dark brown as it grows older. The wild variety is found most abundantly in the autumn or late summer. Another member of this group is the *horse mushroom*, which is similar to the common mushroom, but very much larger and coarser. The *parasol mushroom* is taller and is quite graceful, looking like a miniature white or delicate tan umbrella on a slender handle. The edible *Amanitopsis* must never be confused with its cousin, the deadly *Amanita*, or *death cup*, which has a frill that is lacking in the wholesome mushroom which so closely resembles it. Upon stumps or partially decayed trees may be found the *oyster mushroom*, in clusters, with white gills and one-sided stalks.

Other interesting members of the edible branch of the mushroom family include the delicious *morel*, with its honeycombed cups, the dainty, reddish-yellow *chanterelle*, or *little goblet*; the branching *coral mushroom*, with its exquisite pink, lavender, or amber colouring, most commonly seen in Sweden; the golden *Clavaria*, another branching variety the colour of honey, which is not only of unusual beauty, but most palatable as well. (The genus *Clavaria* contains no poisonous species.) Some of the more uncommon kinds are the *jew's-ear*, of which the Chinese are so fond that they import them from the South Sea Islands; the green *Russula*; the cup-shaped golden *Periza* (100 species of which are British natives), lined with orange-red; the *trembling mushroom*, a quivering, jelly-like mass; and the *liver fungus*, sometimes called *vegetable beefsteak*.

A very beautiful and interesting mushroom is the *water-measuring earth-star*, one of the puff-ball group. Its outer covering bursts into a star-like form, leaving the ball in the middle. The points lie flat when the air is damp, but in dry weather they curl up and let the wind roll the plant about, scattering spores as it travels. One species injurious to timber is the curious *bracket mushroom*, which partially encircles tree-

trunks with its miniature shelves, brown above and white below.

The thread-like mycelium or growing spawn of certain kinds of mushroom, rapidly spreading underground, sometimes temporarily exhausts the soil, so that grass is unable to grow and circular bare patches are made, formerly called "fairy rings."

The Poisonous Kinds. The most dreaded of the poisonous mushrooms are two members of the *Amanita* group, one called the *death cup*, and the other the *fly Amanita*.

The *death cup* grows in the woods from June until autumn. Although it is so often mistaken for the common mushroom, a careful observer could not be misled, for it has white gills, white spores, and the fatal "poison cup" at base of stem; the edible has pink gills, brown spores, and no cup.

The *fly mushroom* can be recognized by its combination of scaly cap and stem, deep frill at the top, bulbous base, and white spores.

There are other dangerous varieties, like *Satan's mushroom* (the emetic *Russula*), and the *verdigris mushroom*, all of which are poisonous to some people and not to others. A most offensive mushroom is the *stinkhorn*, sometimes called the *fetid wood witch*.

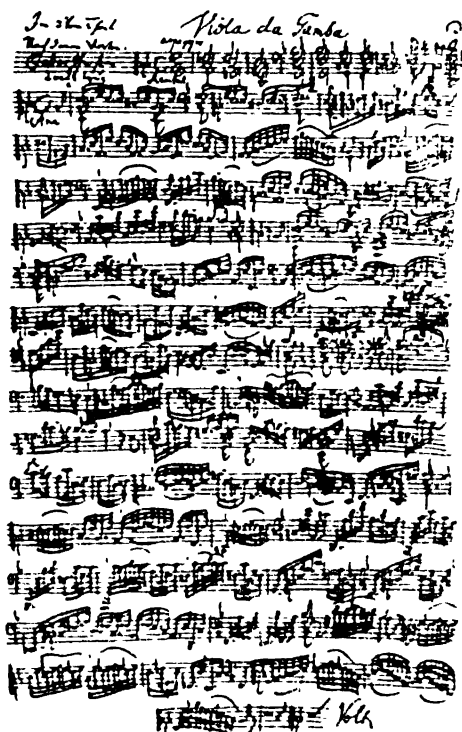
The symptoms of mushroom poisoning are similar in all cases. Severe abdominal pains are always present, followed by cyanosis, a condition of the blood which weakens the arterial flow; collapse follows, and death is almost certain to ensue unless prompt medical attention is given.

Scientific Names. Mushrooms belong to the family *Hymenomycetaceae*. The common table mushroom is known as *Agaricus campestris*.

MUSIC. An art derived from the properties of sound. Musical vibrations set up by a suitable sounding body correspond to a series of mathematical formulae, and cause phenomena of a precisely definable order. These phenomena are the irreducible bricks and mortar of the musical art, which, while reaching to great heights of imaginative freedom, has thus an exact science for its foundation, in that its emotional effect is produced solely by the multifarious combination of certain natural aural relationships. What pigment is to painting, sonority is to music; and it is no more possible to create a new type of sound-relationship than to invent a new primary colour. All artists must work with certain raw materials whose origin is in the natural world, and from which arise the real laws of their art; laws no less inflexible than those that govern other aspects of the material universe and of the human organism. In handling such raw material of art, a technique is developed, in part by individual artists, but in the main by the accumulated experience of many generations

of good work, handed down in a living tradition which all may inherit, but to which none may claim authorship in more than small degree. And some familiarity with the broad outlines of this tradition is necessary not only to the artist, but to those who would enjoy his work.

The Physical Nature of Music. A musical sound differs from other sounds in consisting of vibrations of *regular* frequency; and is thus a *note* of definite pitch, as distinct from



PORTION OF ORIGINAL MS. OF BACH'S
"PASSION OF ST. MATTHEW"
Photo - German State Railways

a noise of indeterminate pitch, since *pitch* (the acuteness or gravity of a sound) depends on frequency of vibration, a high number of vibrations per second giving a high note, and a low number a low note. Notes are referred to by letters of the alphabet, A, B, C, D, E, F, G; after which *they recur at the octave*, different octaves being distinguished by the signs AAA, AA, A, a, a', a'', a''', and so on. Intervals between one note and another are described by number; A to B is a second, A to c is a third, and so on. A to a is the octave or "eighth" (8ve); A to b the ninth, etc. A note is understood to be at "natural" pitch unless made "flat" (lowered by one semitone) by the sign b:

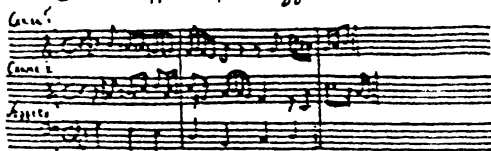
or made "sharp" (raised by one semitone) by the sign \sharp ; the "natural" pitch may be restored by the sign \natural . The note written c' , which is the note one octave above the "middle" c of the pianoforte, denotes the sound produced (on the standard of pitch now most used in England, and termed the "new philharmonic" or "concert" pitch) by 522 double vibrations per second of a sounding body at the temperature of 68° F. The recurrence of notes at the octave (the same note, yet a different sound) and the division of the octave into intervals of tone and semitone, comprise together the most funda-

compound note in question; and since the Fundamental tone is often spoken of as generating the remainder of the series, it has also the name of the *Generator*. The upper partials are not as a rule heard individually in their own right; but they have, nevertheless, an important part to play, in that the quality or *timbre* of a note will depend upon their comparative prominence or otherwise in the sound of the whole. The quantity or *volume* of a note will depend mainly upon the intensity of the vibrations, that is to say, their spatial extent, not their frequency per second. But high sounds, on the whole, tend to be louder than low sounds.

The nearest to a simple tone ordinarily heard is the comparatively lifeless and uninteresting tone of a tuning fork; it is the presence of abundant upper partials that gives its character and colour to any normal musical instrument, such as the violin or the piano. It is true that to detect the presence of the upper partials by the unaided ear requires a deliberate effort of the attention, since we are accustomed to listen consciously only to the *fundamental* pitch of the note. But if, for example, "middle c " is struck on the piano, it is not difficult to pick out some of its more prominent partials. The c' , the g' , the e'' , and the c'' can be fairly easily distinguished with a little practice. If the original c is struck sharply and released, they will be heard ringing quite prominently for a moment or two. The complete series

would theoretically consist of $c, c', g', c'', e'', g'', b''^b, c''', d''', e''', f''^{\sharp}, g''', a''', b''^b, b''^b, c''',$ and so on; but much the most important are those that together comprise what is termed the *common chord* of c , that is to say, the c 's, the g 's and the e 's. The vibration numbers of the series c, g, e will be as $1 : 3 : 5$, and the symmetry of these vibration-frequencies is such that their effect on the ear when they are heard in combination is smooth, soothing and, in a word, *concordant*. And if the notes of c, e and g are struck simultaneously on the piano, the resulting combination or *chord* is of a smooth nature and is what we call a *concord*. It is not only pleasing to the ear, it is also satisfying in a peculiarly final sense, so that we accept it as something complete in itself. And, of course, the intervals c to e or e to g (thirds), and the interval c to g (fifth) are also concordant when sounded by themselves. Moreover, even if these intervals are turned about or *inverted*, they will remain concordant; thus the fifth c to g when inverted becomes a fourth (g to c').

Canone doppio sopra il Soggetto.



Leipzig
Christoph Corradus Emmerich.

Leipzig 1. 15. October 1707.

Leipzig
Johann Sebastian Bach
Leipzig 1. 15. October 1707.

2. p. der hiesigen hiesigen Kirche von geistlichen Personen
am 32. x. d. hiesigen Kirchen am 3. 5. July. 1707.
am 3. Aug. 1707. hiesigen Kirche; und hiesigen Kirchen
am 3. Aug. 1707. hiesigen Kirche.

MUSIC AND SCRIPT IN BACH'S OWN HAND

Photo: German State Railways

mental of all musical phenomena, and we shall do well to examine them a little further.

No matter what the vibration-number of a given sound, the vibration-number of its octaves will always be in the proportion of $1 : 2 : 4 : 8 : 16$, etc.; that is to say, in the simplest of arithmetical proportions, each octave vibrating twice to one vibration of the octave below. Now a simple note would consist of vibrations of a single frequency only; but in practice simple tones are virtually never heard. The normal note consists of a compound of simple tones in combination, of which the lowest in pitch, known as the *Prime* or *Fundamental* tone, is ordinarily by far the most prominent, and therefore determines the vibration-number and pitch of the note as a whole, but is accompanied by a further series of more or less powerful vibrations whose number is in the proportion of $2, 3, 4 \dots n$ (theoretically) to each vibration of the Fundamental tone. The tones caused by this whole vibration series are known individually as the *Partial* Tones (or *Over-tones*) of the

and the thirds c to e and e to g when inverted become sixths (e to c' and g to e'). All these intervals are concordant, because since their vibration numbers are in simple relation arithmetically, the actual sound waves of which they consist are symmetrical too, and do not clash violently with one another.

In this fact we have the essential difference between a concord and its opposite: the *discord*. The most violent discords are those caused by the combination of notes the

the division of the total range of audible vibration into octave sections, each a replica of the other save only in its acuteness or gravity of pitch, gives us the first natural unit of musical sound; a unit recognized wherever music has been known.

The subdivision of each octave into the smaller units which form the intervals of the scale is no less fundamental. If the note G is sounded, the first fourteen partials of that note contain all the notes comprised in the



SALZBURG, BIRTHPLACE OF MOZART

The white building with twin towers in the left centre is the Dom, or Cathedral, and in the background, crowning the hill, is the fortress of Hohensalzburg

Photo: Austrian State Travel Bureau

vibration-numbers of whose fundamental tones lie just short or just in excess of symmetry; for example, $b''b$ and $b''h$ (as 14 : 15), c'' to $b''h$ (as 8 : 15) or $b''b$ to $b''h$ (as 7 : 15).

Now of the available concords there remains the most concordant of all—the octave. Not only are the relations between the fundamental tones of an octave of the simplest form possible; its upper partials also coincide to the greatest possible extent. When to a given note is added its octave above, no fresh partial tones are given, and many of the original ones (those in even vibration-numbers: 2, 4, 6, etc.) are doubled. In consequence, the octave is felt to be so uniquely consonant an interval, that notes of one or more octaves apart do not impress us as possessing a different identity; and

complete scale of *C major*. The scale deducible by arranging them in proper order is known as the *diatonic* scale (diatonic = "through the tones"), and the intervals into which it falls are diatonic intervals. They are as follows—

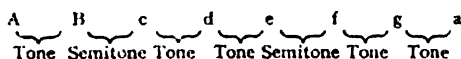
Ex. 1

C D E F G A B C
Tone Tone Semitone Tone Tone Tone Semitone

More precisely, this scale would be known as the diatonic scale of the *key* of C in the *major mode*. Its effect may be tried on the piano by starting from C and proceeding to the right, but using only the white or "natural" keys. Now if the same series of notes is made to start on the A instead of

the C (and still using only the "natural" keys) the following scale results—

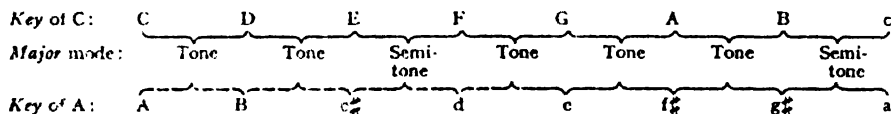
Ex. 2



This is the diatonic scale of the *key* of A in the *minor mode*—in brief, the *scale of A minor*.

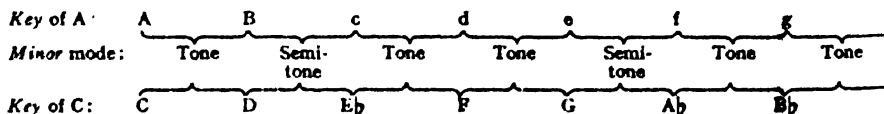
But if, instead of playing in each case the *same* series of notes (i.e. the "natural" or white notes of the piano), we play the *same scale*, beginning on each note in turn—if, that is to say, by making use of some of the black keys of the piano, we preserve the same relation of the tones and the semitones while changing the note upon which they start, a different result will occur. The *mode* will remain constant; it is the *key* that will change. To take an example in the major mode—

Ex. 3



In other words, to obtain the diatonic scale of A in the major mode (i.e. the scale of *A major*) the notes C, F and G must be played *sharp*; played, that is to say, not in their "natural" position, but one semitone higher in pitch. In this way, however much the position or pitch of the scale may vary, the distribution of the semitones within that scale will not be altered. *Mode is changed by changing the distribution of the semitones; key is changed by changing the note upon which the scale is started.* We therefore speak of the first note of each key as its *key-note* (or *tonic*), and name the key by its name. There are as many keys as there are notes; but one more example should suffice to make the principle clear—

Ex. 4

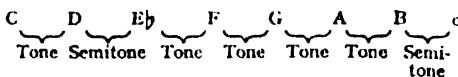


Thus to obtain the scale of *C minor*, the E, the A and B must be played *flat*; that is to say, one semitone below their "natural" position.

For the sake of completeness, it must be added that the minor mode exists in three sub-forms. The basic form is as we have

described. But if a passage in the minor mode happens to be ascending in pitch, it is usually modified in a manner which would give the following result, for the scale of C minor (as used in ascending passages)—

Ex. 5

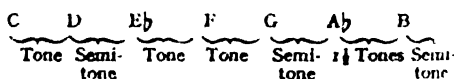


In other words, when a passage in the minor mode approaches its tonic (or key-note) from below, it approximates more nearly to the same passage in the major mode. But the third of the scale (in this case, Eb) *never* takes the major form in a minor passage; and it is the flattened or minor form of this third (in this case, C-Eb) which absolutely determines the minor character of the passage. Since a minor third produces a slight clash between its partials and thus happens to be a faintly less concordant interval than the major third, it is not difficult to see how this difference of

character arises—the slightly restless, unhappy tendency of music in the minor key.

These two forms of the minor scale are termed *melodic* (ascending or descending). The third form occurs less usually in a purely melodic passage, and is termed the *harmonic* form; it is the same in an ascending as in a descending passage, and gives the following scale of C minor (harmonic)—

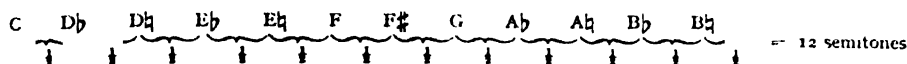
Ex. 6



It will be seen that, no matter how they are distributed, there are **always** twelve semitones, neither more nor less, in a given

scale of whatever kind. The semitone is the smallest unit in a musical scale. Just as the diatonic scale of C major is deducible from the first fourteen partials of the note G, so the *chromatic scale* of C is deducible from the twenty-fourth to forty-eighth partials of the same note. It is as follows—

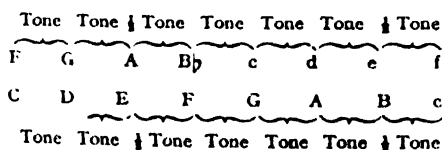
Ex. 7



What then, do we mean when we say that a piece of music is in a certain mode or key, or that it modulates from one key to another? We mean that the notes of the passage in question, or most of the notes, or the most important of them, are such as may be found within the natural scale of that key; and the emphasis which any clear account of music must lay on this apparently rather artificial system of scales, is due to the fact that the scale, for example, of C major provides us with the simplest and most convenient expression of the phenomena of the C major tonality, and of its relation to other tonalities; phenomena which are at the root of the musical art.

Now alterations to the natural position of notes in relation to their scale (*chromatic* alterations of *diatonic* position) by means of sharps and flats, naturals when applied to an already sharp or flat note, and also double sharps (written \times) and double flats (written $\flat\flat$), may be of an ornamental and passing nature only (whence their collective name of *accidentals*); or they may be the means to a definite modulation into another scale or key. If, for example, in the key of C major a $B\flat$ is introduced, the tonality of the music will tend to pass into that of F major, since $B\flat$ is in the natural scale of F major, though not in that of C major. And such modulations are always more easy into a new key whose natural scale possesses many notes in common with that of the original key, than into one whose common factors are fewer. With the one exception of the flattened B, the scale of F major possesses exactly the same notes as that of C major—

Ex. 8



For this reason, and for another of still more importance, there is no easier or more natural modulation in music than this, from any given scale, to the scale on its fourth note; as in this case, from C major to F major. The second reason is that a melody which reaches a given note by the step of a *semitone*, encourages the listener to regard that note as a point of rest. Thus if the notes B and c are played in succession, the c will be felt as a point of rest, and the ton-

ality will be felt to be the tonality of C. If, however, E and F are played, although both are still within the scale of C major, the F will be felt as a point of rest, and the tonality will be felt to be that of F. In other words, the third note of any major scale can very easily transform itself in the mind into the seventh (or *leading*) note of a new scale one-fourth up (or one-fifth down, *which is the same thing at the octave below*). And if to the third of the original scale is added its seventh, *flattened*, and thus proper to the new scale (as its fourth note) instead of the old scale, this tendency is almost irresistible. To complete the chord, we may add the tonic (first, or key-note) of the original scale, which can equally easily transform itself into the fifth (or *dominant*) note of the new scale. Let us see this in action. At (1) is the common chord of C major; tonic, third and fifth. At (2) the flattened seventh is added, pushing the tonality almost irresistibly F-major-wards. At (3) F major is definitely established—

Ex. 9



The converse of these facts is also true. If the key is F major, it is as easy and natural to reach the key of C major as it is to get back again into F major. Thus in the next example, at (2) the key is that of F major, as the *key-signature* (1) of one flat on the line representing b in this clef (C_4 ; the *treble clef*) also indicates. At (3) the raising of the $b\flat$ to $b\sharp$ in the chord of G major pushes strongly towards the key of C. At (4) C major is established. At (5) the once more flattened b pushes back towards F major. At (6), F major has again been firmly reached.

Ex. 10



In this example, at (3) the G major chord with its $b\flat$, leading by the step of a *semitone* to the c at (4), is enough to establish C

major; and at (5) the flattening of the b makes the return to F major equally inevitable, by the fall of a semitone to a, the third of the F major scale; accompanied by the rise of a fourth from c to g.

We now see why the seventh note of any scale is termed its *leading note*; and why its fifth note is termed its *dominant* (i.e. *governing note*). The leading note of C major is B, and its dominant is G. The chord of G and f, or more fully, G, d, e and f, is known as the *dominant seventh* of C major. The chord of c and b \flat , or more fully, c, e, g and b \flat , is the dominant seventh of F major. The leading note of F major is E, and C is its dominant. Now in fuller form, the previous example might read—

Ex. 11

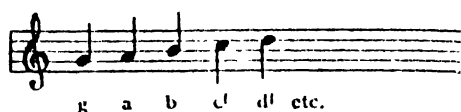


Here at (3) we have the leading note (b \sharp), the dominant (g), and the dominant seventh (f'), of C major; while at (5) we have the leading note (c'), the dominant (c), the dominant seventh (b \flat), and also (though less important) the *supertonic* (g), of F major.

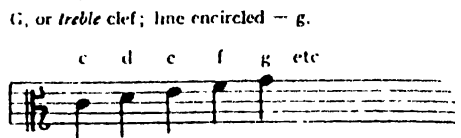
Now, too, we see why it is that an ascending passage in a minor scale tends so strongly to take the form shown above at example (5) and thus to move to the tonic by the step of a semitone; since even minor scales cry out for a leading note, and the insistent relation of dominant and tonic is no less powerful than in the major mode. Similar principles underlie all the complex and multifarious modulations of which the later western music so largely consists. And if it is remembered that the natural harmonic series from which is deducible the whole scale of C is that which arises from the generating or fundamental tone of its dominant, G, it will be realized that this relationship also is a natural relationship, and, like all the essential material of the musical art, based on facts which are a part of the natural universe.

Notation. The notation of music is by a series of symbols representing notes of different lengths, placed upon, or between, the lines of one or more *staves* (sets of five lines, extended above or below, if necessary, by the addition of brief *ledger lines*); the significance of each such line or space being predetermined by a symbol known as the *clef* mark, applied to the staff as a whole. Clefs now in normal use are as follows—

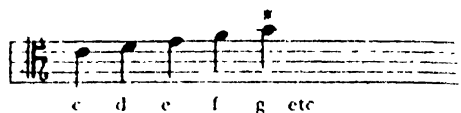
Table 1: Clefs.



G, or *treble* clef; line encircled — G.



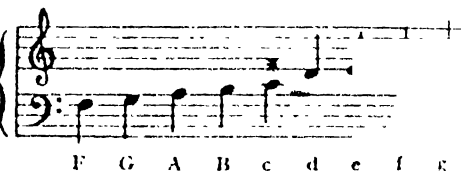
C, or *alto* (or incorrectly, *tenor*) clef, line between pointers = middle c



C clef correctly used as *tenor* clef



F, or *bass* clef, line between points — F



G and F clefs used in combination, to form the *double staff* of the pianoforte
• = ledger lines.

Table 2: Diatonic scale of C major from C to c'. (Next page.)

Table 3: Key signatures (Next page.)

This table also shows at a glance the *Relative Minor* key of each major key, and the *Relative Major* of each minor key. Further nearly related keys may be shown as follows, for the keys of C major and C minor, other keys each possess similar affinities.

Table 4: Keys nearly related to C major—

A minor.
G major.
E minor.
F major.
D minor.

Table 5: Keys nearly related to C minor—

E \flat major.
G minor.
B \flat major.
F minor.
A \flat minor.

TABLE 2. Diatonic Scale of C major from CC to C''

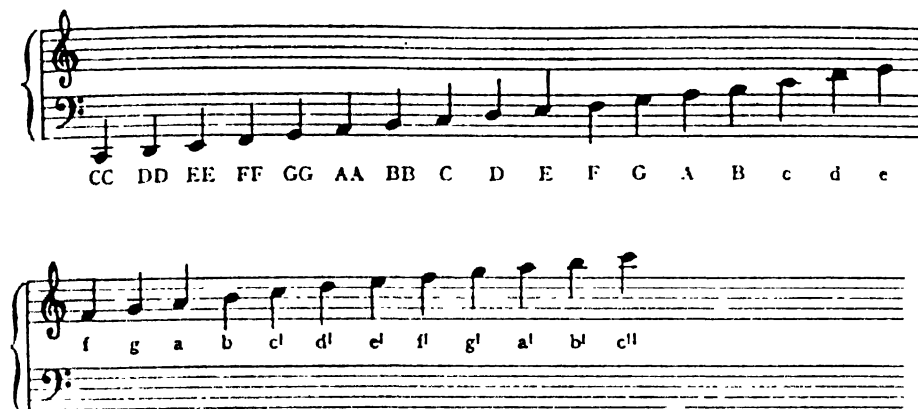
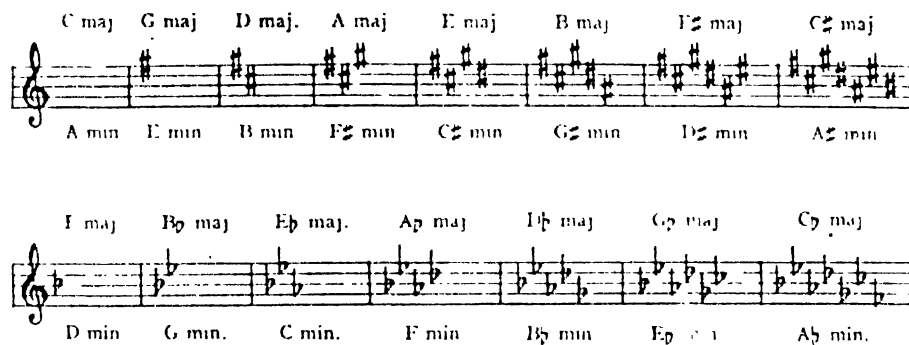


TABLE 3. KEY SIGNATURES.

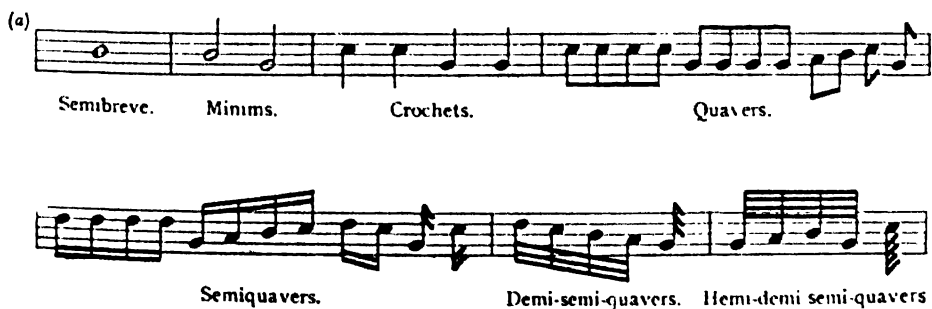


The *relative duration* of notes is indicated by a variety of symbols in which they appear, as follows—

Table 6: Relative duration of notes.

1 Breve = 2 Semibreves.

1 Semibreve = 2 Minims, or Half Notes
 1 Minim = 2 Crochets, or Quarter Notes
 1 Crochet = 2 Quavers, or Eighth Notes.
 1 Quaver = 2 Semiquavers, or 16th Notes.
 1 Semiquaver = 2 Demi-semi-quavers, or 32nd Notes
 1 Demi-semi-quaver = 2 Hemi-demi semi-quavers, or 64th Notes.



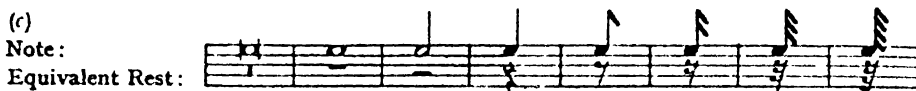
A dot may also be added to any note, signifying a duration of half as long again. For example—

cance until they are set in ordered array, with some definite emotional purpose in view. Three main elements are involved



A pause or silence of definite duration may be indicated by the following signs, termed *rests*.

in this systematic arrangement of sounds to form works of art, being of roughly equal importance, although one or other may



Music is measured in units of convenient length, termed *measures* or *bars*, whose most important function is to determine the position of the main *accents*, of which there will always be one to a bar, on the first subdivision or beat; while if there are four beats to the bar, then two accents will occur, the stronger one on the first beat, and a secondary one on the third beat; if three beats, then three accents, one main and two subsidiary. It is also possible to throw the accent off these usual positions on to a normally unaccented beat, which will then bear the accent sign: > (See also *SYNCOPE*.) The rhythm of the bar and the grouping of the beats are indicated at the beginning of a piece, by a symbol termed the *time-signature* and placed after the clef and key-signature.

Table 7: Time-signatures.

appear to predominate in any given piece of music. They are: *Melody*, any succession of notes following each other in such an order as to make sense to the ear, *Harmony*, any combination of notes simultaneously sounded in such a manner as similarly to make sense in relation to what has gone before and what follows; and *Rhythm*, including not only the obvious bar-to-bar rhythm or *beat*, but also the general architectural lay-out, which must itself conform to some preconceived proportion, so as to balance at each point with what follows and has gone before.

The essence of *rhythm* is regularity, either obviously observed, as in "four square" types of rhythm; or deliberately countered, as in complex "irregular" rhythms—which are, nevertheless, no more than further subdivisions of some essentially regular beat

	Duple: 2 Beats	Quadruple: 4 Beats	Triple: 3 Beats
Simple	C or $\frac{2}{2}$ Two minims	C or $\frac{4}{2}$ Four minims	$\frac{3}{2}$ Three minims
	$\frac{2}{4}$ Two crochets	C or $\frac{4}{4}$ (or incorrectly C) Four crochets (common time)	$\frac{3}{4}$ Three crochets $\frac{3}{8}$ Three quavers
Compound	$\frac{6}{4}$ Two dotted minims	$\frac{12}{8}$ Four dotted crochets	$\frac{9}{8}$ Three dotted crochets
	$\frac{6}{8}$ Two dotted crochets $\frac{8}{16}$ Two dotted quavers	$\frac{12}{16}$ Four dotted quavers	$\frac{9}{16}$ Three dotted quavers

The Language of Music. So much for the musical raw material. Its use in making actual masterpieces of sound is essentially a matter of musical *form*. Sounds, however pleasing, cannot convey an artistic signifi-

Rhythm is thus no more an arbitrary element than are *melody* and *harmony*, whose direct derivation from the physical phenomena of Nature we have already had occasion to describe. And while it is

frequently useful to consider these three elements independently, it is clear that they are completely interwoven in practice; a tune without rhythm (however free) could not exist; harmony without melody (however disjointed) is an equally impossible concept; and melody always implies harmony in some degree, even if that harmony is not actually heard. It is the blending of the three elements into coherent patterns that comprises the art of musical form.

Now we have seen how certain simple progressions, both of melody and of harmony can, by reason of the physical nature of the sound-vibrations of which they consist, give rise to certain definite emotional effects. And it will not be difficult to understand how, throughout the mighty gamut of melody, harmony and rhythm, a similar process of cause and effect may be assumed to be at work. Upon the infinite permutations and combinations, then, of this considerable although limited range of available notes, chords, and rhythms, the art of music is constructed, in unimaginable variety. The choice of actual sounds before a composer is restricted; but the choice of melodic and harmonic progressions is bounded solely by the confines of his imagination. Granted that he is imaginative, his problem is broadly one of selection, development and arrangement. Suppose him to have a musical idea; that in itself is not a piece of music. The idea must be developed in one way or another; suitable further ideas must follow, interestingly new, yet organically connected with what has gone before. Continuity of thought must not be lost, yet contrasts must often be introduced. A coherent whole has to grow out of varied elements; artistic unity must be achieved.

The part of *rhythm* in this structural process is largely one of balance. Consider the first three phrases of "God Save the King." There is very evidently a *rhythmic* balance between them; one answers rhythmically to the other; and so also through the remainder of the tune.

Such short phrases are the smallest units, *melodically* speaking, in music; and the means by which they are built up, as it were

Ex. 12



God save our gra - cious king; etc.

into sentences and paragraphs, is in great degree just this technique of a certain rhythmic correspondence, more or less strict or subtle in any given case. The further element at work is that principle of *harmonic*

key-relationship of whose simplest forms we have already given an example, that of dominant to tonic, in the keys of G, C and F. (Ex. 9-11.) The first phrase of "God Save the King" begins in the tonic key of C major, and ends on its dominant chord (G major). The second is all in the tonic. The third begins on the dominant, and ends on the tonic. There is an elementary key-balance in this extremely simple example (Ex. 12), which is the type of the endless key-successions of far greater complexity.

When it comes to building sections, chapters and whole volumes out of the sentences and paragraphs thus constructed, an essentially similar process is at work. First, some reasonable proportion in the actual extent of the various sections of the work; second, and still more important now, a complex balance and logicity in the planning of the keys through which the music is made to pass. Broadly speaking, it is the actual modulations (key-progressions) upon which the emotional element in music chiefly depends; while the sense of artistic rightness is primarily a matter of the proportioning and balancing of the various musical episodes, and of the keys through which they pass.

In the pursuit of such logical proportions and emotional coherence, it is natural that certain well-defined musical forms should have been developed. These forms are of two broad types, the natural outcome of two rather different ways of writing music.

When a musical idea, in the form of a short phrase, has been thought of, it is possible to announce it upon one voice or instrument; to repeat it (in the same or a different key) upon a second voice or instrument, while the first voice proceeds with a continuation so contrived as to form a suitable accompaniment; to follow that again by a third statement of the phrase upon a third voice; and so proceed to interweave one voice with another in an elaborate network of melodies, two, three or more in number, the outcome of whose simultaneous progress is also, of course, a corresponding network of harmonies.

This is the normal method of *Counterpoint*, and roughly speaking it may be said to have

been the prevailing style of music between about A.D. 1400 and about 1650, when the following radical change took place. Instead of being treated as a complete *theme* to be developed in the *contrapuntal* or polyphonic

("many-voiced") manner just described, the original phrase would now be added to and balanced by means of answering phrases upon the *same* voice or instrument, until a musical sentence (or "tune") was produced. This tune would be made the material of a rather longer, less closely dovetailed type of music. It would be treated in the *harmonic* manner; chords would be made to accompany it, and the individual notes required to produce those chords would then be distributed as tunelessly as possible between the other voices or instruments taking part. This is the so-called *monodic* ("single-voiced") style of music, developed from the work of Monteverde (see MONTEVERDE) and his fellow pioneers. In practice, the two styles of music naturally overlap to a considerable degree. Nor is the historical date at all a rigid landmark, since monodic music with full harmonic accompaniment is met with about A.D. 800 if not earlier, while much quite recent romantic music, such as Wagner's, employs a very great degree of counterpoint. But broadly used, the distinction is of the utmost importance.

In the former, contrapuntal style, the process of quietly fitting together the independent entries of the theme and its melodic continuations, into a harmonic whole, will in itself largely suffice to determine the course of the piece, and give it a remarkable unity and coherence. The main contrapuntal forms are the Motet (which see) and the Madrigal (which see) for voices, the *Recercar* (which see) and English Fantasy for Viols (see VIOL), in which a similar technique was adapted to instrumental possibilities; and the strict Fugue (which see), developed to its highest perfection in the works of J. S. Bach. All these forms are characterized by a simple terseness of structure; an absence of dramatic effect introduced for its own sake; and a reliance on the interweaving of melodies all beautiful in themselves, to give a convincing direction to the piece as a whole.

In the latter, so-called monodic music, the parts may be, at times, almost equally free and tuneful with those of the contrapuntal style; but the composer starts, as it were, at the other end. The main tune (usually, though not always, in the highest part) is his first consideration; accompanying tunes and harmony are added afterwards, as best he can. Moreover he will be far more inclined to introduce striking harmonies and dramatic effects for their own sake; his music will be more extensive and not so concise; it will be planned on more colourful, theatrical lines. Once more, these distinctions are very far from watertight, but they are none the less valid in the main.

Two major forms have developed from the

characteristic nature of the "monodic" tradition: Opera (which see) with its pendant, "programme" music; and Sonata-form, which includes quartets and symphonies, whose architecture is that of the sonata. Opera is a hybrid art, and its forms are not solely determined by musical considerations. Dealing as it does with plots and situations in themselves dramatic, operatic music should be dramatic music *par excellence*. Its art consists in catching and intensifying the emotional significance of the particular drama to which it is the partner. Its contrasts are strongly marked, its climaxes elaborately worked up to and powerfully handled. But because its design is so intimately bound up with the exigencies of the story, it is not to be supposed that its musical proportions can therefore be left to follow automatically. The same principles of balance and growth that govern the construction of a great symphony, are to be found in all successful operatic scores, and none the less valid for being less easily reduced to analysable formulae. Libretto and score must, in fact, be adapted to each other's requirements with skill and inspiration. And if it is remembered that a single happy modulation can change the whole mood and significance of a scene, the primary importance of the lay-out of keys and modulations in this process will readily be understood. The same remarks apply to "programme" music, which may not inaptly be described as opera without words. In this case the composer attempts to translate a dramatic plot into purely musical language, evoking the emotions, although not the details, of each imaginary scene.

In contrast to these special forms of music, in which the dramatic element is at a premium, it is customary to speak of "pure music," in which no specifically dramatic situation is envisaged, although the sense of drama may often be very powerfully present, dramatic surprises engineered, and dramatic climaxes built up, in a manner broadly foreign to the earlier contrapuntal forms. And the element of key-architecture is again markedly to the fore. *Sonata form* is essentially a formula for contriving the passage of suitably selected musical subject-matter through a sequence of keys so planned as to allow a maximum of variety both of mood and material, within an unmistakable unity of purpose. By far the most important and successful of such formulae of the "monodic" schools, it has virtually governed the course of big-scale "pure" music from 1750 (Haydn and Mozart) to just short of the present day (including Elgar, for example, but not, on the whole, the very modern schools).

A Sonata (or a Quartet—which see—or a Symphony or a Concerto—which see) is normally made up of three or four distinct and separate sections, known as *movements*. The first movement is normally in strict sonata form (see SONATA). The second movement is usually a slow movement; it may sometimes also take the strict sonata form, but is more usually in freer style—modified or shortened sonata form; or *Rondo* form—in which a single episode recurs time and again, separated by a number of contrasted episodes (see RONDO); or *Variation* form—in which a main subject is first stated, then presented in many elaborately altered and decorated shapes (see VARIATIONS), or a simple sandwich form of three layers, each complete in itself and suitably contrasted, often finished with a *Coda* (or “tail”) to sum it up. The third movement (not always present) is usually a light affair, either a *Scherzo* (literally, a musical joke), or a *Minuet and Trio*, which is a graceful alternation of two simple tunes on somewhat formal lines, in triple time; or some modified form of one of these. The fourth and (normally) last movement may again frequently be a sonata form movement; or it is often a Rondo, or a set of Variations; or it may even be a fugue.

Each of the forms into which movements may fall possesses a certain characteristic coherence of its own. To create a unified work of art out of the Sonata as a whole is a more subtle and individual affair, a matter chiefly of artistic insight and integrity. But here, too, the foundations are laid by a systematic planning of the main keys of the separate movements concerned. These will be in suitably related keys; and the Sonata, as well as each of its movements, will come finally round to conclude in the key in which it was begun.

The many smaller musical forms are each an attempt to solve, on similar though less ambitious lines, the same problem of variety in unity. Under a plenitude of names, such as Romance, Nocturne, Intermezzo, they tend in most cases to some sort of sandwich form; especially to the obviously satisfying small-scale form: Section A, Section B, Section A. Others, however, are of a freer character; notably the Fantasia, a name which, since the time of J. S. Bach, has ceased to signify any specific type of composition, and is used to denote any piece of music in which the composer allows his fancy the freest possible rein, trusting to his innate sense of design to preserve the congruity of the whole.

The Main Currents of Music. Fifty years ago, Joseph Haydn was known affectionately as the father of music. The known world of

music then consisted of one rich tradition, the great classical school, of which Haydn was the founder and Mozart, Beethoven, Schubert, Wagner and Brahms the great masters. It was customary to speak of the remarkable contrast between music and the other arts; the former, the achievement of the last two hundred years or so; the latter already carried in antiquity to some of their highest points. It seemed natural to admire chiefly Graeco-Roman art and the art of the Renaissance; but certain less reputable schools were on the up-grade. The so-called “primitives” of painting began to rise in cultured estimation. With new research it came to be understood that all periods of human achievement have had their means of self-expression. To-day we no longer speak of music as the newcomer among the arts; we have some cause to suppose that its antiquity may be no less venerable; but its earlier triumphs are still so insufficiently explored that it is not possible to speak of them with precision.

The Greeks, the Egyptians, Hebrews, and many Oriental races attached high importance to the art of music; and we can no longer necessarily assume that their music was more rudimentary than their painting, their sculpture, their poetry or their philosophy. But among early cultures, notation of all kinds tends to be at a discount, and surviving examples are not plentiful. Greek musical notation was precise enough, but here again there is a comparative absence of authentic texts. As it is, the earliest music to have been deciphered, at the moment of writing, on a sufficient scale to carry conviction and a more than antiquarian interest, is a sixteenth-century English MS. containing Welsh music some ten, twelve, or even more centuries old, the music of the Celtic Bards, “as settled by a congress of chief musicians, by order of Gruffyd ab Cynan, about A.D. 1040, with some of the most ancient pieces of the Britons, supposed to be handed down to us by the ancient bards.” (British Museum, MS. Add. 14905. See HARP; HARMONY.) Its contents were no less unexpected than attractive. For here, at a date when only the simplest of Gregorian Plain-chants had been supposed to exist, with all the major discoveries of the musical art still in the future, we find music of high complexity; elaborate, *non-contrapuntal* harmony, often of a most modern richness and dissonance; and a direct power over the emotions, to which the “primitives” of painting offer the most natural of comparisons; music so well developed and so unlike anything previously known, that it must appear to be the fruit of a long tradition of ordered growth.

Its influence may possibly have entered English music again during the sixteenth century; it is not easy to judge.

Now this Welsh music is in strong contrast to the next glimpse that our present knowledge affords; a glimpse of some four-part fantasies (or *Organa*) in remarkably free and interesting counterpoint upon a Plain-chant, of an austere rather than a romantic character, the work of Perotin le Grand, leader of the school of Notre Dame de Paris in the thirteenth century. Yet a certain common element seems to persist in the harmony, suggestive of a tradition whose link has been a reaction rather than a direct inheritance. And thus, in brief, is the kind of conclusion to which all recent research has tended to point. We are having to revise our present conception of an orderly, though rather improbably symmetrical development, notably late in human civilization, say A.D. 850 or so, of naïve unaccompanied melody into simple, and then more and more elaborate experiments in counterpoint; thence to crude harmony; and so in time to the full flower of music as we know it to-day. Instead we must infer that this indisputable growth of simple harmony from counterpoint, in the strict polyphonic music of 1400-1650, was preceded by an earlier phase of great elaboration, whose complex polyphony was not strict, but free beyond limit; whose harmony was dissonant, whose austere nature points suggestively to some reaction of fashion from a still earlier romanticism, the lyrical melodies and uncontrapuntal harmonies of the music of the British Bards. We live to-day in a great age of music; but not the only such age. A Sinhalese musician, listening to the music of the Bards, recently declared the scales on which it is formed to be well known in Indian music. He added that, according to tradition, India and China once possessed a system of harmony of which little now remains. Such are the perplexities in which the origins of music lie concealed.

At a moment when music, whatever its past glories, was unquestionably at a low ebb in Europe as a whole, the historical period begins. We know of no music in the eighth century A.D. any better than the singing in plain unison of those age-old Plain-chants to which the words of the Mass are to this day intoned; with the one exception of the Welsh Bardic tradition, preserved by an isolated people of whose culture we know extraordinarily little. But at some date before A.D. 850 at latest, the experiment was tried of contriving some division of the choir, whereby one half might sing the Plain-chant as before, while the other diverged into some separate yet related melody. This system, which is known as

the *organum*, formed the basis of the growth of counterpoint that followed. It consisted for a time mostly of a sequence of consecutive fourths, fifths and octaves, with a result not unlike the mixture stops of an organ; so that its name, Organum, and even its original starting-point, may have been derived therefrom. Simple as it is, it may have been effective in practice; and its later forms (*Descant* and *Faux-Bourdon*) had unquestionable beauty. The use of sixths now came to play a great part in medieval harmony; more discordant to medieval ears than fourths and octaves, but far nearer to later musical practice. By 1200 or so, music had reached one of its high-water marks. In that form of counterpoint whose melodies pursue a free course, unconnected in theme with their fellows, musical skill and invention could scarcely go beyond Perotin le Grand.

The aim next sought was to devise a form of counterpoint composed not of separate melodic material, but of the *same* theme combined upon itself, so as to give a peculiar unity to the whole. That principle was to underlie the whole Golden Age of polyphony in the succeeding four and a half centuries, and to bear some of the ripest fruits of all musical history. But its immediate effects were not wholly fruitful. After a promising start (Dunstable, Dufay), the new polyphonic composers, not content with having simplified to the smallest compass Perotin's free tunes and unsparing dissonances, while tightening the structure by this novel use of identical themes in each voice of the counterpoint, must needs now revert to renewed complexity of rather less profitable nature. There were composers great enough to bend the new ingenuities to the service of an unsurpassable nobility of thought (Josquin and others); but their lesser fellows, becoming lost in the elaboration of their canons, their puzzle fugues, their imitations, their inversions and the whole growing technical paraphernalia, wandered aridly from the path of beauty, and for a time music fell upon stony ways. It was not until the succeeding generation (Tye, Tallis, Morley, Byrd in England; the Netherlanders Willaert, Archadelt, and Lassus; the Spaniards Vittoria, Morales, Cabeçon, Ortiz; the Roman Palestrina, the greatest of his age) that warmth of purpose became again clearly master and not servant of technical resource. All these men worked to more or less rigid formulæ, with the flexibility of genius; but formulæ, however complicated and however well-managed, always tend to make for limited rather than for varied achievements. The English, never so rigid as their continental brethren,

reached in the early seventeenth century the extreme height of classical polyphony in an art that seems to combine the noblest virtues of pure counterpoint with a freedom of treatment and imagination that has never been excelled—the English instrumental fantasies for viols. England at that time was the acknowledged leader of the musical world.

Meanwhile in Italy an innovation was proceeding, destined to change the musical fashion once more to the monodic style. The harmonic experiments of Monteverde and his fellow revolutionaries paved the way for Haydn, Mozart, and the world of modern music. J. S. Bach, the last of the great polyphonists, had no direct influence on the music of his successors, and with his death in 1750 an epoch in music was at an end. Of the mighty tradition of which Haydn and Mozart were the source, we cannot here give a summary. Its many threads and its constant interplay of musical fashions and lineage are too complicated for such a treatment, not perhaps because they are more numerous than those of preceding eras, but because they are more fully known. The reader is therefore referred to the articles under the names of the main composers and musical forms. Future tendencies it is not possible to prophesy in the confused and uncertain state of present-day music. We can only suggest that, as in the past, the raw materials are immutable, whatever new experiments in the manner of their use may bring to fruit. Some living continuity of tradition—no matter how diversified and individual its manifestations—is an element without which no art can go ahead. But whether that thread now lies with the cold austerities of a Hindemith, or the warmer logic of a Sibelius, or with some great man yet to come, it is not for this article to predict.

MUSICAL BOX. An instrument which reproduces melodies by means of a clock-work mechanism. It consists of a revolving cylinder with projecting pins placed in certain positions. When the cylinder is set in motion by a spring, the pins strike the teeth of a steel comb tuned to the notes of the scale, so producing musical sounds.

MUSICAL INSTRUMENTS. See INSTRUMENTS, MUSICAL.

MUSK. An oily substance with a powerful odour, obtained from a pouch in the male musk deer (which see), and used in the manufacture of perfumes, since it gives permanence to them. The finest quality is imported from China and is known as *Tong-king*. There are various animals and a number of plants—such as the musk mallow, musk orchis, and musk rose—that have or give off

a musk-like odour, but the commercial product is secured only from the musk-deer.

MUSK-DEER. A small, clumsy deer found in the higher Himalayas, parts of Tibet and Siberia. It has no antlers; two large, tusk-like teeth overhang the lower lip. The musk-deer is hunted for the musk pouch (about the size of a small orange), found in the males.

Scientific Name. Musk-deer constitute a sub-family in the deer family, *Cervidae*. The scientific name is *Moschus moschiferus*.

MUSKET. The weapon with which soldiers were armed before the introduction of the rifle. The earliest muskets, first used in the sixteenth century, were fired by a lighted torch or fuse, and were too heavy to handle without a support.

Next came a musket fired by a wheel which, by friction, produced sparks from a piece of flint. This led to the *flintlock* musket, which was fired by a spark from a piece of flint striking against a steel pan in which was placed a small quantity of powder.

The chief handicap with weapons of this type was the loss of time in loading; there were over fifteen movements in loading a "Brown Bess." Napier, writing of the steadiness of the British infantry, says: "When the head of the French columns arrived within fifty paces of the British line, the British 'came to the shoulder' preparatory to loading!"

MUSK-MELON. A fruit produced over a wide area of the New World. Musk-melons are borne on vine plants belonging to the gourd family, and there are several more or less distinct botanical varieties. These are classified according to the shape, size and character of the fruits, which may be oblong or nearly round, and vary in size from a few inches to over a foot in diameter. Their rinds differ, too, both in degree of hardness and in appearance, and the flesh may be white, red, green, yellow, or of intermediate shades.

Musk-melons are cultivated in most warm climates. Among the varieties may be included the *cantaloupe*, which has a hard, scaly rind, which is often deeply furrowed. This name comes from that of a town near Rome (Cantalupo), to which the plant was first brought from its native home in Armenia. Nutmeg melons have softer, more or less netted rinds, and they ripen sooner than cantaloupes.

MUSK-OX. A hoofed animal between an ox and a sheep in appearance. Though it has no scent glands, it is supposed to have a musk-like odour, and so received its name. The musk-ox is regarded as forming a sub-genus in the cattle family. It is about 6 ft.



MUSK-OXEN

in length, with short, stocky legs, cattle-like hoofs, and a very short tail. The entire head and body are covered with dark-brown hair, curly and matted on the shoulders, but hanging straight on the rest of the body. The horns of the male cover the forehead, meeting in the centre and curving downward. They were once found in immense numbers throughout Arctic North America, but are being rapidly exterminated by Indians and Eskimos, who hunt them for their hair and flesh.

Scientific Name. The musk-ox belongs to the family *Bovidae*. Its scientific name is *Ovibos moschatus*.

MUSK-RAT. A member of the mouse family. The name has reference to the strong, musk-like odour of a fluid secreted

chamber is partly or entirely under water, and is connected with under-water passage ways.

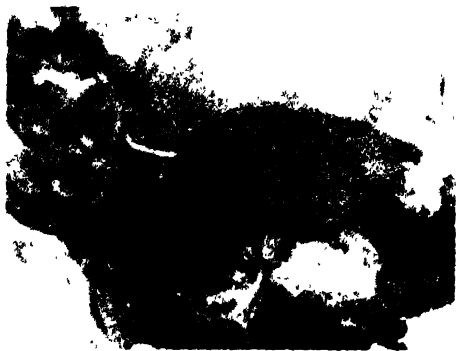
A typical musk-rat is about a foot long, and has a nearly hairless tail about 8 in. in length. Its body is covered with an under coat of thick, soft fur, and with an outer coat of long, shining hairs, dark brown above and grey below. The head is broad and rounded, the ears small and closely set, and there is no distinct neck. Like other aquatic animals, the musk-rat has its hind toes webbed.

Scientific Name. Musk-rats constitute the sub-family *Microtinae* in the family *Muridae*. The specific name is *Fiber zibethicus*.

MUSLIN. Name for any plain-woven cotton fabric of open texture and light weight. It is named after Mosul in Mesopotamia where it was first made. Muslin manufacture was introduced from India into Europe about the end of the seventeenth century, and is now extensively carried on in France, Great Britain, and the United States. The name is also given to cloths of a slightly heavier texture, sometimes printed in colours.

MUSSEL. Two families of shell-fish are known as mussels, the sea mussels and the fresh-water mussels. The name is derived from the Latin *musculus*, "little mouse." These animals, like oysters and clams, are classed as *bivalve molluscs*. Each has a soft, dark-coloured body enclosed in a hinged shell, consisting of a right and a left valve.

Two species of sea mussel are edible. The common species of the north temperate zone is a favourite shell-fish on European tables. This mussel is usually about 3 in. long, though some of the largest specimens are twice that length. Its shell is black on the outside, pearly-blue within. By means of a tuft of long, silky filaments at one



MUSK-RAT

Photo: Canadian Official News Bureau

in a large gland present in both sexes. Musk-rats living in swampy or marshy districts usually build a dome-shaped, two-chambered hut from stalks, sods, and twigs plastered with mud. The lower

end of the shell, the mussel anchors itself to rocks. See MOLLUSCS.

Scientific Names. Marine mussels belong to the family *Mytilidae*, of which the common species is *Mytilus edulis*. The fresh-water mussels belong to *Unionidae*. About 1000 species have been named.



FRESH-WATER MUSSELS
Inner and outer surfaces.
Photo: Visual Education Service

MUSSET, mü' seh, ALFRED DE (1810-1857) French poet, dramatist, and novelist, born in Paris. His first volume of poems, *Talis of Spain and Italy*, appeared when he was but 20 years old and, with the two volumes which followed in 1831 and 1832, gave him a wide reputation.

De Musset's next productions were dramas, some of which met with considerable success; the dialogue is particularly brilliant. Several of his novels, notably *The Confessions of a Child of the Age*, *Margot*, and *Mini Pinson*, are of special interest, as containing much autobiographic material.

MUSSOLINI, BENITO (born 1883). Dictator of Italy ("Duce") and founder of Fascism. His father worked as a blacksmith at Varano di Costa, although the family was of some consequence in the thirteenth century and bore coat-armour.

Benito was trained as a schoolmaster, but after a year's teaching he moved to Switzerland. Here he supported himself precariously by manual labour until his ardent Socialism caused him to be deported. Returning to Italy, he did his military service in the Bersaglieri and then settled in the Tyrol, but was again expelled for political reasons. Once more he returned to Milan, where in 1912 he became editor of the Socialist newspaper *Avanti*.

When the World War began, his colleagues, interested rather in class warfare, wished Italy to remain neutral. Mussolini broke with them, started his own paper, the *Popolo d'Italia*, in which he urged Italian intervention, and willingly answered the call

to the colours. He proved an admirable soldier, distinguishing himself among the *Arditi*, or chosen storm-troops. He was a non-commissioned officer in 1917, when he was seriously wounded and invalidated out.

As soon as he was able he returned to his newspaper, in which he counselled a strenuous war policy. The years immediately succeeding the Armistice caused him grave anxiety. Italy seemed to have gained little by her efforts, and seemed to be in danger of sinking into a second-class power. War weariness had produced a reaction against patriotism and loyalty, so that the ideas of Marxian internationalism were spreading rapidly among the workers. Strikes and other social disorders were epidemic and frequently resulted in scenes of violence. Successive governments, all drawn from parties of the Left, appeared to him equally unable to command respect abroad or to restore order at home, and he feared that his country would shortly develop into a Communist state. He had been a socialist but never an internationalist, and he fought vigorously in his paper against what he regarded as misguided and dangerous ideals.

He did not restrict himself to a newspaper campaign, for in 1919 he founded in Milan a small group of ex-servicemen, about 150 in number, to help in repressing disorder. This black-shirted little force were formed in imitation of the *Arditi*, to whose ranks many of them had belonged. They adopted the name of Fascisti, from the *fascies* or axe and rods carried by the lictors of old Rome. The movement spread rapidly, being reinforced by the followers of d'Annunzio. Serious clashes followed between Fascists and Communists, both sides using methods of terrorism, although the forcible feeding of opponents with castor oil was a peculiarly Fascist device. In 1922 the Fascists were strong enough to smash a general strike, and in the October of that year Mussolini sent four well-drilled armies to march on Rome. They occupied the City, and King Victor Emmanuel III refused the demand of his Socialist Ministry for a decree ordering general mobilization. His action undoubtedly averted a civil war. He then sent to Milan to offer Mussolini the Premiership, which was at once accepted.



MUSSOLINI
Photograph taken at the
time of the March on
Rome.
Photo. U. & U

During the next few years Mussolini organized Italy as a totalitarian State (see FASCISM). All resistance has been ended or driven abroad. At one time, danger seemed to threaten from the wilder elements in his own party; in 1924 the Socialist Matteotti was murdered and Fascist officials were implicated. Mussolini used stern disciplinary measures and regained complete control. He gradually gathered the control of many departments into his own hands, for not only was he Premier but he held the portfolios of Corporations, Air, War, Navy, Home, Foreign and Colonial affairs. All of these, however, except the Premiership and Ministry of Home Affairs, he abandoned when the Ethiopian war was ended. As early as 1927 he succeeded in stabilizing the lire. He has suppressed the Mafia, the secret society which had long terrorized Sicily. He has done much rebuilding in Rome. A few years of his rule stimulated trade and improved the financial position of the country. Italy is once again a great Power, that has been able to extend her protection to a harassed Austria.

His most far-reaching move is probably the Concordat with the Vatican. Ever since the kingdom was founded and the Papal States lost to the Church, government officials have almost always been anti-clerical. This disastrous division in Italian life has now been healed by the agreement of 1932. The Pope is acknowledged ruler of the Vatican City and the enmity between Church and State is over.

Mussolini has accomplished much for Italy, although its permanence is not yet assured. Free speech has been checked and parliamentary institutions abolished, so that it is difficult to judge the real trend of popular opinion. The War with Ethiopia—for whose strategy he is held largely responsible—ended with a conquest, but Italy's trade must have suffered from the application of sanctions. Dictators are human, not eternal, and Italy is fortunate that she has the Crown, vested in the able House of Savoy, which will serve as a national rallying-point when the Duce's strong personality is gone. See ITALIAN-ETHIOPIAN WAR; ITALY; ROME.

MUSTAPHA KEMAL. See KEMAL ATATURK (MUSTAPHA); TURKEY.

MUSTARD. The popular condiment is obtained from the ground seeds of certain species of plants. England, Holland, Germany, Austria and Italy export large quantities.

Black mustard is an annual plant, sometimes attaining a height of 6 ft. or more, found chiefly in sub-tropical countries. It has bright-yellow flowers and brown seeds. White mustard, also an annual, grows from

2 ft. to 3 ft. in height. It may be recognized by its stiff, branching stems, hairy leaves, bristly pods, and small brilliant-yellow flowers. Its seeds are yellowish. When prepared for the market, the mustard seeds are reduced to a fine powder in a grinding machine, and the powder is then purified by sifting. Mustard owes its pungency to an oil contained in the seeds. Besides being used as a condiment, it is a valuable household remedy. Mixed with lukewarm water, it is an effective emetic, and a hot mustard foot bath has broken up many a cold. The



Photo Carters

mustard plaster is a well-known remedy for allaying pain and reducing inflammation.

The Mustard Family, or Cruciferae, *Cruciferae*, is made up of about 1800 species. The botanical name refers to the shape of the flowers, which is like that of a Greek cross (Latin *crucifer*, "cross-bearing"). Important species include, besides the mustards, cabbage, cauliflower, cress, horseradish, radish, and flowering plants like arabis, aubrietia, stock and wallflower.

Scientific Names. Black mustard is *Brassica nigra*; white mustard, *B. alba*; brown mustard, *B. juncea*. *B. japonica* is a species whose curled leaves are used as greens.

MUTATIONS. See EVOLUTION.

MUTE. A device for damping the vibrations of a musical instrument so as to produce deliberately a muffled effect. For stringed instruments the mute consists of a small clip with three prongs, pushed on to the top of the bridge between the strings. For wind instruments, a conical block of leather or metal is inserted in the bell, in such a way as to restrict the passage of the sound. A pianoforte is said to be muted (*con sordini*)

when the left or "soft" pedal is depressed, causing the hammers to strike only one of the three sets of strings normally struck in unison.

MUTINY, INDIAN. See INDIAN MUTINY.

MUTSUHITO, *moot su he' tō* (1852-1912). For over forty years emperor of Japan; born in the mountains of Kyoto, crowned 1868. The country was at this time torn by dissension and strife, following upon Commodore Perry's entrance into Japan and the treaty of 1854, whereby the country was opened to the Occident and concessions were granted to foreigners.

To Mutsuhito was largely due the transformation of Japan from a medieval country to a great power in the Western sense. Among the reforms that he introduced were the following: the establishment of deliberative assemblies; the adoption of the European calendar and European costumes by the court; permission to teach English in the schools; the adoption of a new judicial system, founded on the Code Napoléon, and the abolition of torture. These innovations three times led to unsuccessful rebellions.

Mutsuhito, by which name the emperor was known in Europe and America, means "gentleman." His only son Yoshihito succeeded him in 1912; the latter was himself succeeded late in 1926 by his son Hirohito (crowned in November, 1928). See JAPAN (History).

MUTTON. The flesh of sheep. Mutton of the best quality is pinkish in colour, close-grained, and contains a considerable percentage of hard, white fat, evenly distributed. Old mutton of dark-red colour is deficient in fat. Because of its pronounced flavour, the flesh of sheep is cooled and hung for curing before it is marketed. The meat of an animal less than a year old is called lamb. It is more delicately flavoured than mutton, containing relatively more water and less fat.

MYCELIIUM, *mi se' lium*. See MUSHROOM.

MYCENAE, *mi se' ne*. A city of ancient Greece, which flourished in the Heroic Age before the Trojan War. It was situated in the Peloponnesus on a hill above the Argive Plain, about six miles north-east of Argos. It is traditionally believed that Perseus founded the city, and with his descendants ruled it until they were superseded by the Pelopid dynasty. In Homer it is spoken of as the city of Agamemnon.

The glory of the city apparently declined following the legendary period. It was heard of during the Persian wars in 479 B.C., when Mycenaeans were sent to Thermopylae and Plataea. The city was besieged by the Argives in 468 B.C., and the inhabitants were expelled. In 1876 Dr. Schliemann undertook

excavations, and was later assisted by the Greek Archaeological Society. The expedition made many important discoveries. The massive fortifications around the city and the Lion Gate are still standing. See AEGEAN CIVILIZATION.

MYOCARDITIS, *mi o kar di' lis*. Inflammation of the muscular wall of the heart.

MYOPIA, *mi o' pia*. A form of defective eyesight which is commonly known as *short-sightedness*. The source of the trouble is that the eyeball is too long. As a result, rays of light are brought to a focus in front of the retina, instead of on it, and this causes the image to be blurred. Short-sighted persons must wear glasses having concave lenses; that is, lenses thin in the middle and thick at the edges. Such lenses are the opposite of the eye in shape, and they bring the light rays to a focus on the retina, thus correcting the trouble. Some persons are born near-sighted, but in others the defect is developed by misuse of the eyes, such as doing close work for long periods without rest. See EYE; BLINDNESS.

MYOSOTIS. See FORGET-ME-NOT.

MYRIAPODA, *mirri ap' od a*. A class of long, slender, worm-like animals, represented by the centipedes, galleyworms and millipedes. Their class name, which means "having ten thousand feet," refers to their numerous appendages, which serve as legs. They have a distinct head, bearing one pair of antennae, or feelers, and a group of simple eyes, a few are eyeless. Their bodies are divided into numerous segments, seldom numbering less than twenty-four, on these are borne the slender leg appendages. Though grouped together in one class, yet the centipedes and millipedes show considerable differences. The former are carnivorous, poisonous, and have only one pair of legs to each body segment, whereas the latter are vegetarian, harmless, and have two pairs of legs to each body segment. A bite from some of the larger species of tropical centipedes is exceedingly dangerous. See CENTIPEDE.

Classification. Myriapods belong to the phylum *Arthropoda* (which see).

MYRON. A sculptor of ancient Greece. See SCULPTURE.

MYRRH, *mur*. A fragrant, gum-like substance which oozes from a species of shrub found growing in parts of Arabia and Eastern Africa. The plant itself has scanty foliage, small green flowers and oval fruits. The oil from the gum is used in medicines, incense and perfumery. In Britain, where the plant is native, it is commonly known as Sweet Cicely.

Used with aloes, in the form of pills, myrrh is taken to relieve colic. Tincture of myrrh

is employed as an astringent in mouth washes and gargles for diseased gums and relaxed throat.

MYRTLE, *mur' t'l*. An evergreen shrub or small tree that bears shining, blue-green leaves and fragrant white flowers. The plant is native to the countries bordering on the Mediterranean Sea and to the temperate regions of Asia, and is grown in warmer parts of England. The leaves, bark, flowers, and berries are aromatic. Among the ancient Greeks, the myrtle was sacred to Aphrodite, goddess of love.

Scientific Names. The common myrtle belongs to the family *Myrtaceae*. It is classed as *Myrtus communis*.

MYSOORE. A native state of Southern India, comprising, on the west, a hilly district where the Western Ghats broaden inland to a plateau reaching 8000 feet, and on the east, a more level upland. The chief rivers are the upper reaches of the Cauvery and Kistna; they are here not navigable but have been much embanked for irrigation, which largely explains the State's prosperity. The climate (in contrast to the neighbouring Malabar coast) is healthy, and the soil very fertile, producing rice, cotton, pulse, coffee, sugar and various grains. The Kolar goldfields—supplied with electric power from the station at Cauvery Falls, 90 miles distant—are increasingly important; there are carpet and silk manufactures and sandalwood and granite trades. The religion is Hindu, the chief languages Kanarese and Telugu. Area 29,326 sq. miles; population (1931) 6,557,302. Bangalore, the capital, is a centre of state railways and has cotton and silk manufactures; the climate allows of the production of European fruits and vegetables, and the town is much favoured by Europeans. Population 242,000.

MYSTERIES. In ancient Greece, and later also in Rome, solemn religious celebrations were held in honour of certain gods or goddesses. No one was admitted except those who were initiated and took the vow of secrecy, violation of which meant death. This explains the name *mystery*, coming from the Greek *mysterion*, "secret." The purpose of the mysteries was not only to render worship, but to instruct the people in religious observances, and by mystic dramas to preserve the traditions connected with the divinity.

The greatest of all the Greek mysteries were the *Eleusinian*, celebrated in honour of Demeter and her daughter Persephone.

Little is known of initiation ceremonies. The candidate is believed to have prepared himself by fasting and a sacrifice which he offered. He was first introduced to the *Lesser Mysteries*, which took place near

Athens in the month of Anthesterion, which corresponded approximately to our February.

After the sacred relics had been brought to Athens from Eleusis six months later, the celebrants gathered, and at the prayer time received solemn purification in the salt water of two sacred rivulets. On the two days following, they offered sacrifices and attended various ceremonies, after which they formed a procession to return the relics to Eleusis. Initiation ceremonies and sacred rituals, designed to impress the spectators, occupied the following day and night. The rite was brought to a close on the tenth day, when water was solemnly poured from two earthen jars, one toward the east, the other toward the west.

No less interesting was the mystery called *Dionysian*, devoted to the worship of Dionysus, or Bacchus. The ceremonies were in the nature of wild orgies, which later became so corrupt that they were prohibited. Others were the *Samothracian*, celebrated in Samothrace especially, in honour of the Cabeiri, Pelasgian gods; and the *Orphic*, connected with the cult of Dionysus and practised by private sects claiming to possess secret knowledge of the means to win happiness after death.

MYSTERY PLAY. One of the earliest of mediæval dramas, usually a representation of scriptural scenes and incidents. Often, however, the name is used interchangeably with *miracle play*, applied to a dramatic spectacle founded on the lives of the saints. The mystery play grew up in the Church, and was used by the clergy as a means of instruction. Some special scene from the Bible would be chosen and presented by the clergy in the church; thus, at Easter the Resurrection might be rudely shown, at Christmas, the journeying of the Magi, the wondering shepherds, and the worship of the Babe in the manger.

In the course of time, these plays became more and more dramatic, and were acted by guilds and players. The streets or public squares were the scenes of the performances, which were given on movable stages.

The earliest mystery plays took place as early as the beginning of the eleventh century, while the last mystery of which there is positive record was performed in 1580, after the regular drama had obtained a firm foothold. The Passion Play, given at Oberammergau in Bavaria, is closely related to the old mystery plays. See **DRAMA**; **MIRACLE PLAY**; **PASSION PLAY**.

MYSTICISM, *mis' tis iz'm*. This term implies the ability to experience union with God. Mystics believe they have knowledge of spiritual things which the natural intellect is unable to attain. The term does not belong to any particular system or religion.

This sense of union is usually accompanied by an exaltation which renders the individual passive and oblivious to all that is material. The Hindu philosophy embodies elements of mysticism in its teachings that the existing universe is apparent and not real, and that the highest goal is attained by subordination of the personality to the spirit. Neo-Platonism is grounded in mysticism, and its concepts are based on contempt for things worldly, and the liberation of the soul by mystic revelation.

There have been many great Christian mystics. Saint Bernard of Clairvaux, Saint Victor, Saint John of the Cross and Saint Teresa are numbered among the greatest. The Protestant churches are not without their mystics. The Quakers, who practise meditation, founded their religion on mysticism.

MYTHOLOGY, *mith ol' o ji.* Study of *myths*, that is, of legends handed down by tradition and recounting the exploits of gods and goddesses, heroes and princes of ancient times. Myths differ from *history* in that they invariably contain accounts of supernatural or wildly improbable events, so that, though often (possibly always) founded on fact, they nevertheless bear the stamp of fiction. Indeed, the word "myth" is often used to mean a story which is too improbable to be believed, although it may contain a germ of truth. Almost all peoples of the world have a stock of these myths, some nearly forgotten, others still kept alive in the speech and literature of the people.

Origins of Myths. Many myths are concerned with the actions of gods and goddesses, and are thus in some way based on *religion*. Others, again, narrate the lives and deaths of kings and queens and other notable people, and therefore appear to be founded on *history*. Finally, many myths appear to be attempts to explain or illustrate natural phenomena, such as the succession of night and day, the seasons of the year, storms, floods, droughts and all the rest of the pageantry of Nature. These may therefore be said to spring from some sort of Nature-study or primitive *science*. The disputes among scholars have arisen over the various attempts which have been made to show that these three sources of myths are in reality one and the same.

The first of these theories was that known as *Euhemerism* from its originator Euhemerus, a Greek philosopher of the fourth century B.C. According to this theory, all myths are based on history and recount the actual doings of men and women who lived on this earth. It is pointed out that myths grew up among peoples who had little or no knowledge of writing; they were handed down orally from generation to

generation. It is a matter of common experience that a story does not lose in the telling; hence the mass of impossible or improbable detail with which these tales are usually adorned. Even the gods and goddesses of Greece and Scandinavia (according to the Euhemerists) are only kings and queens of prehistoric times magnified into divinities. This explanation of pagan gods as mere deified human beings has not



satisfied most students of the origins of religion; while the connection of many myths with natural phenomena seems too obvious to be so lightly dismissed as is done by the Euhemerists. This theory, therefore, is not generally accepted, at any rate in its extreme form. Another most fascinating theory is that all (or, according to a more modest version, most) myths are *solar myths*, i.e. that they are purely fictitious allegories representing the journeying of the sun through the day from morning to evening or through the year from early spring to winter; this theory, therefore, selects Nature-study or primitive science as the sole source of myths, to the exclusion of religion and history. It is certainly at first sight remarkable how many myths do to some extent fit the "solar myth" formula.

A good example is the story of the Rhine-gold as told by Wagner in his famous cycle of operas. In briefest outline the story is that Siegfried, a youth of semi-divine birth, after showing marvellous strength and promise in boyhood, goes forth into the world and kills the dragon Fafnir, who was keeping watch over a treasure of gold (the Rhinegold). Seizing the gold for himself, Siegfried goes on his way, and after braving

the bright gold of the sunshine. He awakens the pure and virginal Spring (or Morning), but later deserts her for a shameless paramour, Summer (or Midday). Spring (or Morning), now sad and disillusioned Autumn, (or Afternoon) comes to reclaim him; but the Sun is now doomed to die, his death being marked by a great fire (Sunset), and the bright treasure of the sunshine is buried once more. The story of Hercules, of his twelve labours, his wife Deianira, the "other woman" Iole, and his death on a funeral pyre, is in many ways similar; and other myths have been found (or with some effort persuaded) to fit the same formula.

This theory, like Euhemerism, is now generally discredited in so far as it claims to be a complete explanation of the origin of myths, as it is wide enough to fit almost anything. Indeed the average novel could quite easily be shown to be a solar myth. In *The Golden Bough* (which everyone interested in mythology and pagan religions should read, at least in its abridged form), Sir James Frazer has shown how deeply the lives of primitive peoples are affected by the belief that, by means of appropriate ritual, Man can control the operations of Nature. To the primitive mind the Universe is not governed by a sovereign and omnipotent Being whose actions, though they may be to some extent influenced by prayer, are not subject to any human prediction or compulsion; but rather by mysterious Powers which can be made to act according to Man's will by means of solemn and elaborate rites and ceremonies.

All forms of magic or superstition, ancient and modern alike, are founded on this belief, and Sir James Frazer has shown how the celebrations which are to be found among all peoples and religions at the principal changes of the seasons, at midwinter, spring, midsummer and autumn, are in their remote origins attempts, by some kind of imitative or suggestive ritual, to compel the powers of earth and sky to respond to the hopes and wishes of mankind. Once a ritual has taken a particular form which is consecrated by custom, it tends to retain it and to be kept up from generation to generation, long after people have forgotten why that particular form of ceremony was adopted.

What more natural than that priests and poets, in answer to the people's demands for an explanation, should invent stories about their gods and goddesses, adapting the details of the story to the details of the ritual, and showing how, for instance, the springtime festival was really a representation of an episode in the life of Persephone, of Adonis or of Balder? The object of many of these primitive rites was to promote the fertility of the earth; and therefore, when



great dangers, rescues the maiden Brunhilda, who had been put to sleep on a high rock under a spell until some hero should win his way to her side. Loving each other at first sight, Siegfried and Brunhilda live happily together until the urge comes upon Siegfried to seek further adventures in distant lands. In the course of his travels he meets Gutrune, for whom he deserts Brunhilda. Brunhilda is brought to the place where Siegfried is staying with Gutrune, but Siegfried is treacherously slain, and the lovers are reunited only in death on a great funeral pyre whose flames engulf the whole kingdom of the heavens; and the Rhinegold is thrown back into the Rhine, from which it originally came.

Translating this picturesque tale in the light of the "solar myth" theory, Siegfried is the Sun, who slays the dragon Winter (or Night) which was keeping imprisoned

the rites were linked up with the cults of particular deities, these latter had to be represented as having that same quality, the goddesses as mothers of many children, the gods as males of inexhaustible virility. This was naturally a fruitful source of myths, and accounts for the flagrant immorality attributed to most pagan gods and goddesses. The gods and goddesses were commonly represented as having amorous adventures with mortals as well as with each other, and this gave another great opportunity to the inventive talents of poets. In ancient times poets were usually minstrels, who were employed by kings and other great men to sing at their feasts and assemblies. The theme of the minstrel's song was the praise of gods and goddesses and of his master and his master's ancestors. What greater compliment could a minstrel pay to his patron than to show in song how his patron was really the descendant of some god or goddess, and to recount with a wealth of detail the circumstances of this divine origin? To sum up, it would seem that very few myths are purely historical, purely religious or purely scientific in origin, but that most of them owe their development to a combination of all these elements.

Greek and Roman Mythology. At an early stage in their history the Romans identified their gods and goddesses with those of the Greeks, and adopted the Greek mythology in its entirety. The mythology of Rome is practically the same as that of Greece, with different names and certain additions concerned with the foundation and early history of Rome. According to the Greeks, the principal gods and goddesses dwelt on Mt. Olympus, in the north of Greece. They were Zeus (Jupiter), the king of the gods, his sister and wife Hera (Juno), his brothers Poseidon (Neptune) and Hades (Pluto), his sons Apollo, Ares (Mars), Hermes (Mercury) and Hephaestus (Vulcan), and his daughters Athena (Minerva) and Artemis (Diana). Poseidon was the ruler of the sea, and Hades of the underworld, the land of the dead. There was also Aphrodite (Venus), who was not the child of Zeus, but was born out of the foam of the sea. Zeus and Hera were the children of Kronos (Saturn), who was one of the Titans, the children of Uranus (Sky) and Gaea (Earth). Kronos had supplanted his parents as ruler of the world, but had in his turn been overthrown by Zeus. Among the lesser deities were Heracles (Hercules) and Dionysus (Bacchus), both sons of Zeus by mortal women, Eros (Cupid) the son of Aphrodite, and Demeter (Ceres) the sister of Zeus and her daughter Persephone (Proserpine). Many of the Greek myths are concerned with the doings of the gods

among themselves, but more deal with their incursions into the lives of human beings. One great group of legends tells of the Siege of Troy, an event which is now generally believed to have happened in reality. Another large group is concerned with the misfortunes of the house of Oedipus. Greek mythology, as it has come down to us in poetry and drama, shows a progressive leaning toward modern religious conceptions.

Scandinavian and German Mythology. With some differences of detail and in the forms of the names, the same mythology is found in Germany as in the Scandinavian countries. According to this mythology, the universe is divided into three regions, Asgard, the sky, the home of the gods, Midgard, the home of mankind, and Utgard, the home of the giants. Midgard supports the sky and is itself upheld by the great ash-tree Yggdrasil, under the roots of which is Niflheim, the underworld, the home of the dead. In Asgard the Aesir (gods) dwell in a mighty castle called Valhalla; with them live the heroes, men of royal lineage who have fallen bravely in battle and are brought to Valhalla by the Valkyries, the warrior-daughters of Odin. The king and father of the gods is Odin (in German, Wotan) and his wife is Freya (or Fricka). There are twelve Aesir besides Odin, chief among whom are Thor (god of thunder) and Tiu (god of war). The great enemy of the gods is Loki, represented sometimes as a god, and sometimes as a giant, the father of Hela, queen of the underworld. Unlike the Greek gods, the Scandinavian deities were not regarded as immortal, but were fated to perish in the great destruction which they called "the twilight of the gods," when, under Loki's leadership, the powers of darkness were to overthrow Asgard.

Medieval Mythology. A certain number of myths have grown up since the beginning of the Christian Era. Many of these recount the adventures of knights in search of the Holy Grail, one large group being British in origin and dealing with King Arthur and the Knights of the Round Table, another large group coming from Germany. Other medieval myths centre upon Charlemagne and his nephew Roland, and arise out of the struggle between Christianity and Islam in the Middle Ages. The lives attributed to some of the saints, e.g. Saint George, are generally regarded as mythical. The central feature of all these myths is the medieval code of chivalry, whose ideals they illustrate; they differ from pagan myths in that their heroes are represented as doing their brave deeds not for personal ends but for the glory of God.

MYXOEDEMA, *mik se de' ma*. See GOITRE.

THE WORLD BOOK

Nn

N. The fourteenth letter of the English alphabet. Like *m*, it has come with little change of form or value from the Phoenician alphabet, though, in course of the change in the direction of writing to the present left-to-right method, the letter

𐤍 𐤎

has been reversed. The Phoenician name of the letter was *nnn*, which meant "fish," and some scholars have succeeded in seeing in the original form a crude sketch of a fish's head with open mouth.

The sound of the letter in English is simple and unvarying. It is a nasal, by far the most common of all the nasal sounds, but is also classed as a liquid or semi-vowel. In combination with *g*, it forms a nasal, as in *sing*, the *g* serving merely to modify the *n* and not being pronounced alone. In a few words, *n* is silent, as in *hymn*

NABOB. See **NAWAB**.

NABOPOLASSAR, *nab o po las' ar*. A Babylonian king and the founder of the New Babylonian Empire. He reigned from 625 to 604 B.C. At first he was a vassal king, but as the outcome of a revolt, he gained power over the practically independent district of Chaldea. Later, in 606 B.C., with the aid of the Medes and Scythians, he destroyed the Assyrian Empire, bringing about the fall of Nineveh, and making his the supreme authority in the Euphrates Valley. By means of a canal, Nabopolassar brought the waters of the Euphrates to the city of Babylon.

NABOTH, *nay' both*. Owner of the vineyard coveted by Ahab, whose wife, Jezebel, caused Naboth to be stoned to death.

NACRE, *nay' ker*. See **MOTHER-OF-PEARL**.

NADIR, *nay' dir*. The point in space directly below where one stands. To an observer on earth, the sky appears to be a half-dome, whose edge forms a great circle resting on the flat surface of the earth. Imagine a plumb line suspended from the centre of this dome, directly above the head, passing through the centre of the earth and into space as far as the central point of the invisible half-dome beneath the earth. The two points marking the ends of the imaginary plumb line are, respectively, the *zenith* and the *nadir*. See **ZENITH**.

Figuratively, *nadir* refers to the lowest point in a mental decline, in one's spirits, or in a person's career.

NADIR SHAH GHAZI, KING OF AFGHANISTAN (1881-1933). The uncle of King Amanullah was Minister Plenipotentiary in Paris in 1929 when his nephew was de-throned, owing to resentment caused by Westernization. When the throne was usurped by Amir Habibullah, Nadir Shah returned to Afghanistan and organized resistance. Habibullah was shot at Kabul and Nadir Shah was forced by public opinion to ascend the throne; his initial refusal, on plea of ill-health, was probably in the interest of his exiled nephew. He restored order, abandoning many of the unpopular reforms, and insisted on the neutrality of his country. To Britain he expressed friendship and gratitude for financial aid. His reign was disturbed by intrigues which he sternly suppressed, until he was assassinated in Kabul.

NAEVIUS, *ne' vius* (c. 270-204 B.C.). First Latin dramatist and epic poet. In drama he developed and amplified the style which had been set by Andronicus. When his first play was produced, the drama was a novelty, but at his death it was firmly established in the national life. Only small fragments of his work have survived, but what is extant shows that he excelled in both comedy and tragedy. The greater part of his work was derived from Greek sources, and consisted of adaptation and translation, mainly from the work of Euripides. At the same time he introduced certain native Latin themes,

legendary and historical. Still more important was his work in the field of epic. Andronicus had translated some Greek originals; Naevius adopted a Latin theme—that of the Punic War, and set it in the native Latin verse, the Saturnian metre. According to contemporary critics, much of the *Aeneid* is derived from this source.

Naevius incurred the jealousy of the Metelli, and was at their instigation imprisoned, and later exiled.

NAGASAKI, *nag a sah' ke*. A Japanese seaport. See JAPAN.

NAGOYA, *na goy' a*. A Japanese seaport. See JAPAN.

NAHUM, *nay' hūm*. Seventh of the minor prophets of the Jews. In the book of the Old Testament which bears his name, Nahum foretells the fall of Nineveh.

NAIADS, *nay' adz*, or *ni' adz*. In classical mythology, the special divinities of springs, fountains, brooks and rivers. Goats and lambs were sacrificed to them; milk, fruit and flowers were offered to them, and oil, honey and wine were poured out as libations. See NYMPHS.

NAIDU, SAROVINI (born 1879). The daughter of Dr. Aghorenath Chattopadhyay, a Brahmin educational leader, she was educated at King's College, London, and at Girton College, Cambridge. Her volumes of English poetry—*The Golden Threshold*, *The Bird of Time*, and *The Broken Wing*—made her famous. In 1898 she married Dr. Naidu, Medical Officer to the Nizam of Hyderabad. She became a leader of the women's and student's movements in India, proving an eloquent speaker. After the World War she joined Mahatma Gandhi's civil disobedience campaign. In 1924 she visited South Africa, where she condemned the treatment of Indian workers. In 1925 she was the first Indian woman president of the National Congress. In 1932 she was sentenced to a year's imprisonment for defying a police restriction.

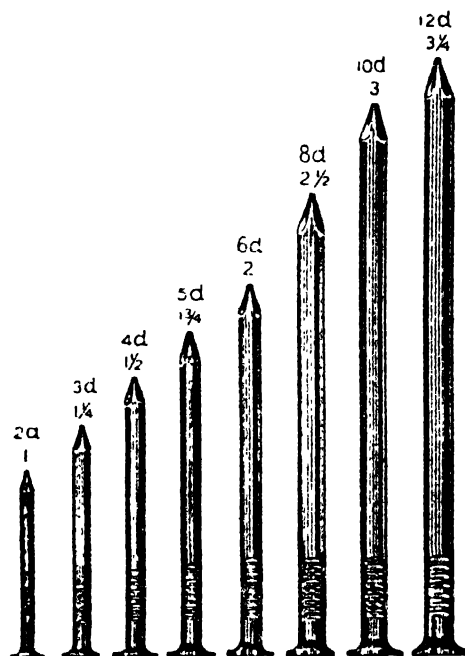
NAILS. The claws, talons and hoofs of birds and animals are of the same composition as the nails that develop on the fingers and toes of the human body, and all are special growths of the outer skin, or epidermis.

The nails of man serve as protective coverings. The skin below the nail, from which it grows, is called the *matrix*. Near the root of the nail, the cells are smaller and carry less blood; the white, crescent-shaped spot indicating these cells is called the *lunula* (from Latin *luna*, "moon"). If a nail is torn off, it will usually grow again, provided that the matrix has not been severely injured.

NAILS. It was not until the last quarter of the nineteenth century that the wire nail,

or French nail, as it was at first called, became popular. The old-fashioned square nails are cut from plates of steel, iron or other metal. They taper, but are not sharpened. The wire nail, however, as it is much cheaper to manufacture, has rapidly displaced the older type.

In the process of manufacture, soft steel wire is reeled into the machine. The wire is cut by nippers and pointed by pliers, and the head is fashioned into shape with a hammer. According to the size, a hundred nails up to



WIRE NAILS

Numbers refer to the length of the nails in inches.
d means penny

ten times as many come out of the machine every minute.

The wire nail may be bent and does not break as easily as the cut nail, but the latter holds better and is more durable. A specially forged cut nail is used in horse-shoeing.

Formerly, nails were always described as *sixpenny*, *eightpenny*, etc., the word *penny* either referring to their price in medieval England or, more probably, being a corruption of *pound*. It is now customary to describe nails by their length.

Nails are sold by weight. Below four-inch, nails increase in price as they increase in size.

NAIRNE, CAROLINA (OLIPHANT), BARONESS (1766–1845). A Scottish poetess, several of whose songs have become permanently

established in the public favour. Among the best known are *The Land o' the Leal, Caller Herrin', The Laird o' Cockpen*, and the fine Jacobite song, *Will ye no' come back again?*

NAIRNSHIRE. This north-easterly county of Scotland is bounded on the north by the Moray Firth, on the east by Moray and on the south and west by Inverness-shire. The population of 8294 in 1931 showed a decrease of 496 compared with the previous census figures. The area is 124,968 acres.

very picturesque highland settings. The Muckle Burn is the only other stream of importance. The principal inland waters are Loch Loy and Cran Loch, separated from the sea by the sandhills, and formerly part of the Moray Firth. A feature of Nairnshire is its mild and equable climate and relatively low rainfall, the temperature of the warmest month being 57½° and of the coldest 37½°. The mean rainfall is between 24 and 25 inches.

History and Antiquities. Originally a sec-



NAIRN

Seen beyond the railway bridge over the River Nairn.

Photo: Taylor

Physical Features. The county lies on the northern fringe of the highland area, and is divided into two clearly-defined physical divisions. On the north is an alluvial plain bordering the Moray Firth. The sandhills on the borders of Moray are unique in Scotland, and have covered the original soil to a great depth, so that the erstwhile village of Maviston has disappeared. The central lowlands are cultivated throughout and divided equally between arable, pasture and woodland. The land gradually rises and merges into the Grampians, two ridges of which penetrate the county, on either side of the valley of the Findhorn. The highest point is Carn Glas, 2162 ft.

The chief river is the Nairn, well known for its trout and salmon. The Findhorn, for part of its length, flows through the county in

tion of the Kingdom of the Picts, what is now Nairnshire became part of the Province of Moray, ruled over in the second half of the first millennium A.D. by earls who enjoyed a great measure of independence (see MORAY). Its history is largely identified with that of Moray until the end of the twelfth century, when it was created a sheriffdom by William the Lion. The chief event in more recent history was the Battle of Auldearn, 1645, in which the Marquis of Montrose defeated some 4000 Covenanters, who are said to have lost half their number.

Prehistoric antiquities are represented by numerous stone circles on the hills, particularly at Moyness, a number of monoliths and early crosses, and a group of lake dwellings. There are a number of medieval castles, among which Cawdor Castle is a fifteenth-

century edifice on a site which shows traces of earlier fortifications.

Agriculture and Industries. Apart from agriculture there are no important industries with the exception of fishing, which is carried on from the harbour of the county town, and some quarrying of granite and freestone. Less than a quarter of the total area is cultivated, and of this about half is given over to permanent pasture. Sheep, cattle, horses and pigs are all reared successfully. The leading crops are oats, barley and root crops.

The county town and only Burgh is Nairn, with a population in 1931 of 4201. As well as being the principal market town and fishing port, it is a fashionable watering-place enjoying an excellent climate.

NAIROBI, *nī rō' bē*. Capital of Kenya (which see).

NAMAQUALAND, *na mah' kwa land*. See SOUTH-WEST AFRICA.

NAMES, PERSONAL. A thousand years ago, the usual custom in names was to give only one instead of the three which most people have to-day. If two boys in the same village were named *John*, one might be known as *Peter's son*, the other as *Jack's son*. When they grew up, they could be distinguished as *John the carpenter* and *John the shepherd*, or, perhaps, *John long* and *John short*. If one of them moved to a new home, he might be spoken of as *John from the North*, or *John the Scot*, or *John of Selkirk*.

All of these names, except the one *Christian* name, were merely nicknames (which means "added"—*eke*—names). Originally, even the name given a child by its parents had a meaning. Among the Hebrews, *Isaac* meant "the laughter," while *Solomon* signified "prince of peace." The same custom prevailed among the early Saxons, as we see from the name *Ethelwulf*, which means "noble wolf," and it was revived by the Puritans, who called their daughters *Mercy*, *Patience*, *Faith*, *Hope* or *Charity*.

Gradually it became customary for nicknames to pass from father to son and be family names. Of course, this had been the practice among the land-owning classes, whose members were known by their estates, (e.g. *von Hindenburg* and *de Chateaubriand*). In the days when few could read or write, names often became corrupted. Thus, *Sanderson* came from *Alexander's son* and *Mitchell* from *Michael*. *Fitzhugh*, *Pugh* (which was once *ap-Hugh*) and *McCue* are really the same, for *Fits* and *ap* are Norman and Welsh for "son of," while *Mc* means either the "son of" or "from the clan of." The Irish *O'*, the German *-sohn* or *-son*, the Scandinavian *-sen* or *-son*, the Russian and Serbian *-ovitch* and the Rumanian *-escu* are all like the English *-son*, and the names

Johnson, *Johansson*, *Hansen*, *Ivanovitch* and *Jonescu* are exactly alike in meaning.

The people of most nations write their "Christian" names first and their family names last, but the Chinese reverse this plan. Thus Dr. Sun Yat Sen properly was Dr. Sun, not Dr. Sen.

NAMUR, *nam ūr'*. See BELGIUM.

NANA SAHIB, *nah' na sah' hib*, (about 1820—about 1860). A name applied to DUNDHU PANTH, when he became leader of the Sepoys in the Indian Mutiny in 1857. He was an adopted son of the ruler of the Malhatta state of Bithur, and became active in stirring up discontent upon the refusal of the British Government to continue a pension which had been granted to his foster-father. Upon the outbreak of the Mutiny in Cawnpore, he placed himself at the head of the rebels there. After the rebellion was suppressed, he fled to Nepal. See INDIAN MUTINY.

NANCY, *nahN' se*. See FRANCE.

NANKING. Capital of North China since 1928, under the Government of the Nationalists. It is situated on the Yangtze River, about 194 miles north-east of Shanghai, and in the province of Kiangsu. The city was built on the site of an ancient city. It was known as Nanking, or "southern capital," during the Ming dynasty, though then given the distinctive name of Ying-t'ien, and it was the capital of the Empire between 1368 and 1403.

This city was famous for its beautiful buildings and monuments, but when it was captured by the Taiping rebels in 1853, the great wall was made a ruin, and the famous porcelain tower, built by the Emperor Yung-lo (1403-1428), was completely demolished, and other buildings were damaged.

Nanking has long been noted for its silks, and other products of its industries are paper, pottery, artificial flowers and satins. The first industrial exhibition of China was held in Nanking in 1911, and the second in 1921. A railway has been opened from Shanghai and another to Tientsin. Population (1931) 633,000; (1933) 1,300,000. See CHINA.

NANSEN, FRIDTJOF (1861-1930). Celebrated Arctic explorer, born near Christiania (now Oslo), Norway, and educated at the university in that city. He was interested particularly in zoology, and his first exploring expedition, in 1882, was made in search of zoological specimens. In May, 1888, he crossed the icefield of Greenland from east to west.

The great object toward which Nansen looked forward was to explore the basin of the Arctic Ocean. Driftwood from Siberia,



THE MING TOMBS AT NANKING

Photo: Topical

and the appearance of relics from the *Jeannette* expedition on the Greenland coast, led him to believe that a ship might be carried by the ice-drift north from Siberia across the Pole, and south to Greenland. He succeeded in interesting the Government of Norway in his theories, and a vessel, the *Fram* ("Forward"), was fitted out for him.



NANSEN

Photo: U. & U.

In the *Fram* Nansen left Christiania, 24th June, 1893, and in September forced his way into the ice pack found near the New Siberia Islands. The *Fram* drifted, suffering no damage from the ice, until 14th March, 1895, when Nansen and Lieutenant Johansen left it and set out toward the Pole with sledges. The latitude which they reached on 7th April, 86° 14', was 184 miles farther north than any point before attained by man, and within 272 miles of the Pole. Returning, they

reached Franz Josef Land, where they were obliged to winter. In the following summer they returned to Europe with the Jackson-Harmsworth expeditions. Meanwhile the *Fram*, after drifting to latitude 85° 57', had drifted back to Spitsbergen and returned to Norway soon after Nansen's arrival.

Nansen played a prominent part in the separation of Norway from Sweden, and from 1906 to 1908 was minister to Great Britain from Norway. In 1908 he returned to the Norwegian capital to begin work as professor of oceanography in the university there, and in 1910 he made an oceanographic voyage in the North Atlantic and published the results. In 1912, 1913 and 1914, he went on further cruises and expeditions, writing accounts of his discoveries and experiences after each adventure. For relief work after the World War he was awarded the Nobel Peace Prize for 1922.

During his last ten years he was engaged, first in the repatriation of prisoners of war, then in relief work in famine areas in Russia, and lastly in the succour of Armenian refugees.

He was made Lord Rector of Aberdeen University in 1926. The records of his polar

adventures and researches appear in several books, including *The First Crossing of Greenland*; *Eskimo Life*, a description of his winter sojourn with the Eskimos of Greenland; *Farthest North*, an account of the expedition in the *Fram*; *Northern Mists*; and *Through Siberia*. See POLAR EXPLORATION.

NANTES, *nahNt*. See FRANCE.

NANTES, *Edict of*. The first formal recognition in European history of the principle of religious toleration. The edict was signed on 13th April, 1598, by King Henry IV of France, in the city of Nantes, and marked the end of a struggle between the Roman Catholics and Protestants that had long harassed the kingdom. By this decree, the Huguenots (French Protestants) were given the same civil rights as the Roman Catholics, and granted liberty of conscience in religious matters, on condition that they paid tithes to the Catholic Church in France and celebrated the Church festivals. The edict remained in force until its revocation by Louis XIV in 1685. See HUGUENOTS.

NAOMI. The mother-in-law of Ruth.

NAPHTHA, *naf'tha*. Since ancient times the word *naphtha* has been applied to a large number of volatile (rapidly evaporating) liquids, the first of which was a fluid form of asphalt burned in lamps by the ancient Egyptians. The word occurred in several ancient languages, and originally meant "most".

Petroleum *naphtha* is now the most important form of *naphtha*. It is the volatile part of the oil, from which gasoline, benzine and similar products may be obtained by refining. *Naphtha* is valuable as a cleaner, as a solvent of rubber, and as a domestic fuel.

NAPHTHALENE, *naf'thā leen'*. Substance obtained as a by-product of coal tar distillation and in carbonization processes. It distils over from coal tar in liquid form in the "middle oils" between 180° and 240° C, and when purified from other products, solidifies as white, glistening plates, having a peculiar tarry odour. About 40,000 tons are produced annually in Great Britain. Naphthalene gives rise to a number of derivatives, used extensively in the preparation of artificial indigo and numerous other dyestuffs. It is well known in the form of moth balls for preserving furs and woollens.

NAPIER. The name of two British generals.

Sir Charles James Napier (1782-1853). He served in the Peninsular War at Corunna and Badajoz, and went on an expedition against the United States. In 1841 he was put in command at Bombay, his great achievement being the conquest of Sind.

Created Governor, he reduced the new state to order, abolished the feudal methods of land-tenure, and sought to raise a race of farmers who would rely only on the Government. He gained the respect and affection of all but his directors, whom he treated cavalierly. He returned home in 1847 and studied military reform.

Napier of Magdala, ROBERT CORNELIS, FIRST BARON (1810-1890). In 1826 he went to India, where he fought in the Second Sikh War, becoming chief engineer of the Punjab. During the Mutiny he served under Sir Colin Campbell, and he also fought in China. Appointed Commander-in-Chief at Bombay in 1865, he was sent two years later in charge of the Abyssinian punitive expedition. His victory over the Abyssinians and his capture of Magdala procured him a peerage.

NAPIER, JOHN (1550-1617). A mathematician, born in Edinburgh, who gained scientific fame as the discoverer of logarithms (which see). He also invented various ingenious devices for multiplying and dividing ("Napier's Bones") and for extracting square and cube roots, and he originated a number of formulas in trigonometry.

NAPLES. The third largest city of Italy. Its population in 1935 was 882,736. It is one of the busiest ports and manufacturing centres of the country. It lies on the north shore of the Bay of Naples, at the foot (and on the slopes of) hills that, seen from the water, have the aspect of a vast amphitheatre. Mount Vesuvius rises nine miles away to the south-east.

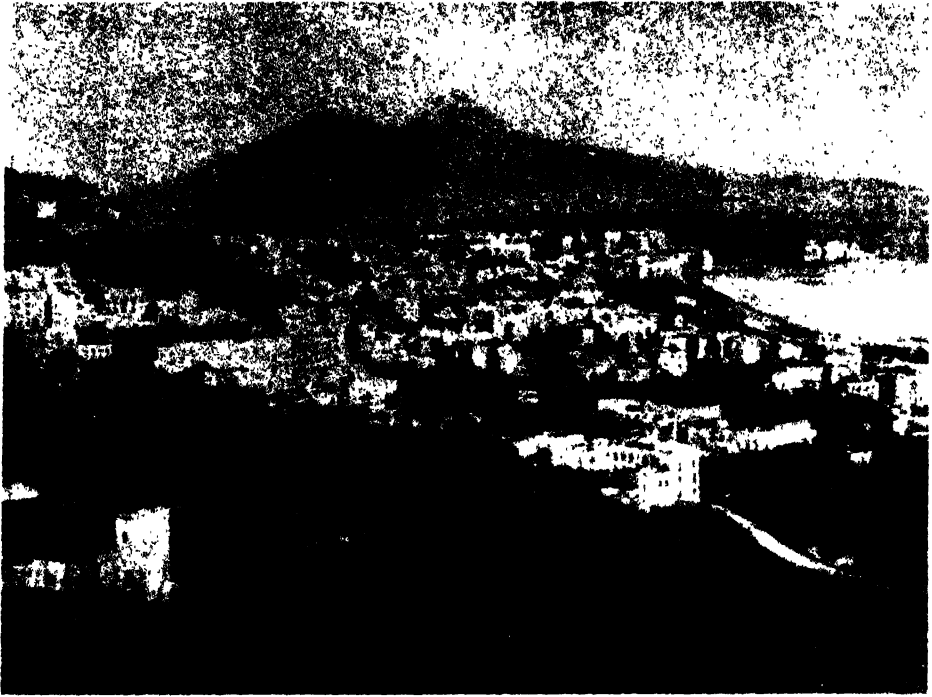
The buildings of special interest include the National Museum, containing priceless collections of art and numerous relics from Pompeii; the San Carlo Opera House, one of the largest in all Europe; about 300 churches, including an ancient Gothic cathedral; and many castles. One of the most



SIR CHARLES NAPIER
(National Portrait Gallery)



LORD NAPIER OF MAGDALA
(National Portrait Gallery)



GENERAL VIEW OF NAPLES, WITH VESUVIUS

Photo: Far

interesting of these castles is the egg-shaped Castello dell' Ovo, dating from 1283 and called the "Bastille of Naples." The city has a university founded in 1224 by the Emperor Frederick II.

Industrially, Naples is important as a centre for shipbuilding, locomotives, textiles, gloves, glass, wine and machinery.

The city was founded as a Greek colony from Cumae several centuries before Christ. In the Middle Ages it was made the capital of the Kingdom of the Two Sicilies. The tomb of Virgil, the ruins of the ancient cities of Herculaneum and Pompeii, destroyed by an eruption of Vesuvius in A.D. 79, and the remains of Roman temples, palaces, and tombs make the surrounding region unusually interesting.

NAPLES, KINGDOM OF, known as the **KINGDOM OF THE TWO SICILIES.** Norman families settled in the eleventh century in Naples and Sicily, and in 1130 Roger de Hauteville became King Roger I. In 1194 the double kingdom was conquered by the Hohenstaufen Emperor Henry VI, who had married the daughter of Roger I. Their son was the brilliant Emperor Frederick II (1215-1250). The Papacy claimed suzerainty over Naples and therefore strongly opposed

the Imperialists and encouraged the nobility to revolt. In 1268 Conradin, the last Hohenstaufen, was defeated and killed by Charles of Anjou, brother of Louis IX of France. Charles, who had agreed with Clement IV to recognize the papal overlordship, established himself as king, but his harsh rule led in 1282 to the Sicilian Vespers, when nearly all the French in Sicily were massacred. A rival claimant now appeared in Peter III of Aragon, who had married a Hohenstaufen. The Papacy supported the Angevins and war continued, the Angevins holding Naples and Aragonese Sicily. Robert the Wise, who ruled Naples from 1309 to 1342, was a man of ability and culture, but after his death the realm was torn by the struggle between his granddaughter Joanna I and her kinsmen, Louis of Hungary and Charles of Durazzo. Charles triumphed, but his reign and those of his children, Ladislaus and Joanna II, were periods of disorder. In 1443 Alfonso the Magnanimous of Aragon and Sicily gained control of Naples, which he ruled admirably until his death in 1458, when his son Ferdinand I or Ferrante took Naples, and his brother John Aragon, Sardinia and Sicily. In 1495 Charles VIII of France claimed the country and invaded it, at first successfully.

French and Aragonese disputed the country until in 1502 Gonzalo da Cordoba—*El Gran Capitan*—secured the country for his master Ferdinand, now ruler of a united Spain.

The Two Sicilies formed part of the Spanish power until the reorganization after the War of the Spanish Succession, when they passed to Savoy and to Austria. In 1738 Charles of Bourbon, a Spanish prince, became independent sovereign and introduced various reforms. His son Ferdinand married Maria Carolina, sister to Marie Antoinette. Republican ideas spread among the upper classes, and in 1799 the Royal Family fled with Lord Nelson's aid to Palermo. The "Parthenopean Republic" was founded, to the discontent of the common people who remained loyal. The King returned in 1802 but fled to Palermo in 1805, Napoleon declaring his own brother Joseph to be king. On Joseph's promotion to the Spanish throne, his place was taken by Joachim Murat, the cavalry leader, who introduced reforms and made concessions to Neapolitan feelings. He renounced Napoleon, declared for him again on his return from Elba, and was dethroned by Austrian troops. Ferdinand had meanwhile grown unpopular in Sicily. Lord William Bentinck persuaded him in 1812 to grant a constitution, but the King abolished it on his restoration to Naples. He kept his absolute power with Austrian aid. The short reign of his son Francis I is noted chiefly for corruption. Ferdinand II, who ruled from 1830 to 1859, crushed a Sicilian rising with Neapolitan troops, and roused European indignation by his treatment of political prisoners. Francis II, his son, was dethroned in 1861, for Garibaldi had conquered first Sicily and the Naples, and the Double Kingdom was absorbed in the Kingdom of Italy.

NAPOLEON. A standard gold coin of France, value 20 francs.

NAPOLEON I, EMPEROR OF FRANCE (1769–1821). Napoleon Buonaparte was born at Ajaccio in Corsica. His parents belonged to ancient but undistinguished Italian families, long settled in the island. Letizia Ramolino, his mother, was a resolute and forceful woman; Carlo Maria de Buonaparte, his father, was intelligent and imaginative, but unstable. He had been a lieutenant of Paoli, the Corsican leader, but had submitted to the French shortly before the birth of his second son. This new loyalty demanded payment; he was tireless in exacting concessions from France, among them being free education for two of his sons. Napoleon, with his elder brother Joseph, was therefore admitted in 1778 to the military school at Brienne, where he stayed for five years. He seems to have been chiefly noticed for his independence and fierce pride. At

history, mathematics, and geography he excelled, studying them furiously in his spare time, but he would not work at any subject he thought unimportant. After a year at the military college at Paris, during which time his father died, he joined an artillery regiment at Valence as second lieutenant. He was well trained and interested



NAPOLEON BONAPARTE

From the painting by Paul Delaroche.

in his military duties, but he seemed as likely to develop into a man of letters as into a soldier. His enthusiasms just then were for Republicanism and Corsican Independence; neither of these passions was to last.

For some years he seems to have wavered between the positions of Corsican patriot and French officer. During the confused years of the Revolution he returned to Corsica, but a quarrel with Paoli caused his whole family to be driven out. By 1793 he was an obscure captain, going round Paris, as a contemporary said, looking like a hungry wolf. Friends in Robespierre's government gained him command of the artillery at the siege of royalist Toulon, and he scored a brilliant success. The fall of Robespierre was a dangerous setback, but he was remembered by Barras, one of the ablest of the new Directory, when the royalist reaction became threatening. On 15th October, 1795, he commanded the troops in defence of the

Tuileries and broke up the mob with his cannon; this was the first time since the start of the Revolution that a resolute resistance had been made to the Sovereign People in arms. The Directory appointed him as general of the Army of Italy, and he set out early in the next year, after his marriage to Josephine de Beauharnais.

Bonaparte—for he now dropped the Italian "u" from his name—won with his ragged and ill-paid army a succession of brilliant victories. The Battle of Lodi was fought in May, 1796; by the close of 1797 he had set up republics on the French model, conciliated the Papacy, and forced Austria, in the Treaty of Campo Formio, to give up all claim to Lombardy and the Netherlands. In 1798 he landed with an army in Egypt, having taken Malta from the Knights of St. John on the way. This expedition was aimed at the empire and commerce of

England, now the only hostile Power. He defeated the Mamelukes at the Battle of the Pyramids, and invaded Syria. Nelson's victory in Aboukir Bay had cut off his retreat, but he seems to have intended either to make his way home by Constantinople or else to march through Persia to India, whence the English were to be driven with the help of "Citizen Tipou" of Mysore. The defence of Acre ruined his plans and, leaving his army in Egypt, he slipped through the English blockade to France. Here he allied himself with Sieyès, a regicide and member of the Directory. On the plea of national danger the Councils were urged to alter the Constitution. Napoleon, always at his worst when dealing with elective assemblies, was blustering and unimpressive, but Lucien, his younger brother, appealed to the soldiers, and all but thirty trustworthy deputies were thrown out. The remnant voted supreme authority to three Consuls; the legislative bodies were in future to be nominated rather than elected, and the will of the Sovereign People was to be expressed, when necessary, by plebiscite. Napoleon became First Consul, and soon found himself, at the age of thirty, absolute ruler of France. He gained in prestige rather than in power when he was proclaimed Emperor.

First Consul. Napoleon has been set down as a brilliant but vulgar megalomaniac who sacrificed the liberty of France for imperial splendour, and the peace of Europe for military glory. He himself disapproved of power based entirely on force—"It is not as a general that I rule, but because the nation believes that I have the civil qualities that fit one for ruling." The Consulate was generally regarded in France as a natural development of the Revolution, which was thus saved from royalist reaction. The people, wearied with tumultuous liberty, willingly voted him power for life and the

right to fix the succession. The Empire was merely an attempt to stabilize this situation; the presence of the Pope at his coronation would bind the Roman Catholics to him; the brilliance of the court would lure back exiled nobles. Even the splendid titles given to



IN EGYPT ON THE THRESHOLD OF HIS CAREER

From the painting by Edouard Détaillé.

Photo: Visual Education Service

his generals were not only for show but to secure their support by playing on their vanity—"Men will let themselves be killed to become princes." The institution of the Legion of Honour had been a move of the same sort: "I feel my isolation. So I cast anchors of safety all round into deep water." He always remembered that his throne was founded on popular support and that, though the Bourbons had been Kings of France, he was Emperor of the French. As to the accusation that he sought war, he seems to have understood that peace was necessary to make his power safe. Victory he could secure, but never lasting peace, for England always stirred up enemies against him. Pitt and his successors aided France's enemies with subsidies, not with loans, realizing that to furnish a struggling ally with munitions is as much a point of war as to supply one's own army. Except for a small loan to Austria, nothing of the great sums advanced to the Continent was repaid, nor did England demand repayment. This was not due to love for Bourbons or even hatred for Bonaparte. In 1795 the Convention had voted the annexation of Belgium; Napoleon could not have given this up and kept his hold on France. "Even if the enemy had placed their headquarters in the Faubourg St.

Antoine, the French people would never have ceded their rights, nor renounced the union of Belgium." England was equally resolute, for it was, and is, vital to her safety that no strong military power should hold the Belgian coast. Real peace was therefore impossible, and this Napoleon knew—"England will wage war on us as long as we hold Belgium."

Yet for a while it seemed as if peace had been secured. Napoleon led his army across the Alps and at Marengo defeated Austria, who submitted, in the Treaty of Lunéville, to French control of Western Germany. In the next year England agreed to the Peace of Amiens, and Napoleon could concentrate on his domestic reforms. Administration, finance, and education were reorganized, while Roman Catholicism was officially restored. Officials were recruited from all political parties, Talleyrand the ex-bishop

and Fouché the Jacobin both being ministers. The First Consul frequently attended the meetings at which the Code Napoléon was drawn up, and seems to have shown remarkable acuteness and legal knowledge, although his contribution to the work is impossible to assess. These activities were hampered in 1803 by renewed war with England. In 1804 came a royalist attempt on his life; in retaliation he had a Bourbon, the Duc d'Enghien, kidnapped and brought to France, to be hastily court-martialled and shot. This horrified Europe, but so reassured the Republicans, who suspected Napoleon of royalism, that he was shortly acclaimed as Emperor. The coronation was held in Notre Dame on 2nd December, 1804. Pope Pius VII had come to perform the ceremony, but Napoleon, mindful of Revolutionary sentiment, crowned himself in defiance of all arrangements. In the next year he also assumed the iron crown of Lombardy.

England the Arch-Enemy. The army now encamped at Boulogne for an invasion of England. For the control of the Channel the Emperor was willing to sacrifice his fleet. Villeneuve successfully lured Nelson to the West Indies and returned, but, after an indecisive action with Sir Robert Calder's

squadron, he put into port, and Nelson's arrival finally ruined the plan. Napoleon at once hurried his army eastward. The year 1805 saw his greatest victory, for the rout of the Austrians and Russians at Austerlitz came soon after Mack's surrender at Ulm, it also saw the real cause of his downfall, for Trafalgar made the conquest of England impossible, and he was now bound to incessant wars, although his country needed peace. The fatal defeat, however, was forgotten in the glory of his campaigns. Prussia next resisted him, only to be crushed at Jena in 1806. He occupied

Berlin, where he issued the Berlin Decree, which sought to ruin England by closing European ports to her trade. This eventually forced on him an attempt to dominate Europe, for the plan could only be effective if universally applied. England replied by Orders in Council, which announced a

blockade of France and her allies. In 1807, after victories at Eylau and Friedland, he met at Tilsit Tsar Alexander I, and for a time dominated his imagination. They made peace, and proceeded to parcel Europe up between them. Alexander agreed to the changes made after Austerlitz, by which sixteen German states were made into the Confederation of the Rhine, while Louis and Jerome Bonaparte became Kings of Holland and Westphalia. More important still, he agreed to shut British goods out of his realm. Napoleon, in return, gave up his idea of freeing Poland, although a warlike and enthusiastic ally would have been of great service to him. From now on his policy was the building up of a European Federation against England, and all who would not join met rough treatment; for this reason the Papal States were annexed and the Portuguese Royal Family banished.

Spain was a market for English goods; Spain was perplexed by squabbles between the King, the Prince, and Godoy, their Minister. It was natural that in 1808 the Spanish Bourbons should vanish into France and the throne be filled by Joseph Bonaparte, whose place as King of Naples was taken by Murat, the cavalry commander. Unex-



NAPOLEON BEFORE THE SPHINX

From the painting by Gérôme.

Photo: Visual Education Service

pectedly, however, Spain flared into revolt. English armies were landed and the long-drawn-out Peninsular War began, to drain France of men and money and to help make Frenchmen weary of war. Year by year Sir Arthur Wellesley consolidated his position against the best Marshals of the Empire—Soult, Masséna, and Marmont. Meanwhile, a second meeting with the Tsar and a host of minor royalties at Erfurt had resulted in little but reassuring speeches, and in 1809 Austria declared war. Napoleon was defeated at Essling, but wiped this out with a victory

at Wagram. Austria again made peace, and in the next year he divorced Josephine and married the Archduchess Marie Louise, daughter of the Emperor Francis. This, like the setting up of his brothers as kings, was another anchor cast in deep water: but none of these anchors was to hold when the storm came. The situation was brightened in 1811 by the birth of his son, the King of Rome, but war with Russia was becoming inevitable, for Russia had openly disregarded the Berlin Decree. This economic war had caused much discontent in Europe, the effective English blockade was a hardship, and the want of English manufactures was only overcome by wholesale smuggling.

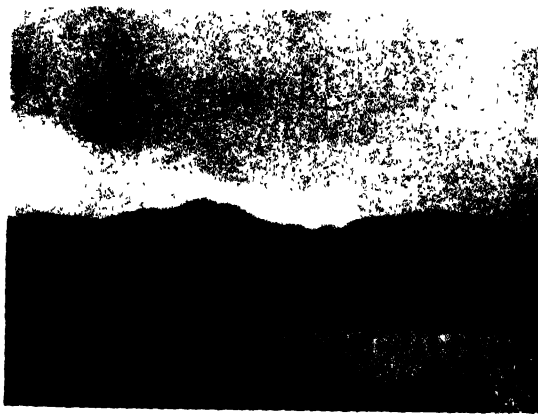
Retreat from Moscow. In 1812 Napoleon invaded Russia in support of his Continental System. The Russians retired; needing a victory to force a peace, he followed. Kutusof made a stand at Borodino, but Napoleon failed to overwhelm his army and the retreat continued. By September he was at Moscow, to find the city, like all the country through which he had passed, cleared of people and provisions. A fire, started either by Russians according to set plan or by the carelessness of French looting parties, destroyed a great deal of the city, and made it uninhabitable for the winter. Napoleon lingered for a while, hoping that Alexander would come to terms. In October he ordered the retreat to begin. The winter set in late that year, arriving with sudden severity. The Grand Army, dressed for a

summer campaign and short of supplies, died by hundreds. Even the cavalry horses were killed for food. Cossacks hung round the flanks, and had to be repeatedly driven off by Marshal Ney and the rearguard. There was fierce fighting at the crossing of the Beresina. When the miserable ruin of an army reached Poland, the Emperor hurried back to Paris to raise fresh forces. Encouraged by this disaster and by the success of Wellington in Spain, Austria and Prussia joined the war. In 1813 he was defeated at Leipzig. In 1814 he fought a brilliant but

unavailing campaign in France, until he was forced to abdicate by his marshals. The Allies gave him the island of Elba; his wife and child were sent to Vienna where a Congress met to resettle Europe.

Waterloo. For a time came reports of how he was contentedly organizing his little island, but in March, 1815, he landed in France with a small

force. When troops were sent against him, he advanced alone and appealed so successfully to their memories that their royalist officers had to run for it. Within a few days he was in Paris, and the restored Louis XVIII was again an exile. This revival of enthusiasm was encouraging, nevertheless, France was in no mood to endure more years of war, and the Allies had pledged themselves to his destruction. The campaign opened with dramatic fitness in Belgium. Napoleon defeated the Prussians at Ligny, while Ney kept the English busy at Quatre Bras. On 18th June the French failed to take the English position at Waterloo, and the arrival of Blücher's Prussians turned the defeat into a rout. Napoleon returned to Paris, and, finding no support there, surrendered himself to England. He was sent to St. Helena, in the Atlantic, where he died in 1821. His last years there were mostly spent in quarrelling with Sir Hudson Lowe, the governor of the island, and in persuading Europe that Sir Hudson's fussy, narrow-minded watchfulness was a deliberate and fatal persecution.



ST. HELENA

The island on which Napoleon spent his last years.

Photo: Cherry Kearton

Estimate. Napoleon was a mixture of contrasts. His imagination was fired by fantastic schemes—Ossian was his favourite poet—and his genius for practical details enabled him to carry them out. He seems to have been ingeniously adaptive rather than original; the plan of the Consulate, the scheme for the invasion of England, the Continental System, were none of them his own, while the methods of strategy he applied are to be found in the excellent military textbooks of the old royalist army. He had the gift of co-ordination and a remarkable memory, to which much of his success was due. The triumph at Toulon was the result of a few hours spent there some years before. Studying the French character as a foreigner, he played on its weaknesses, making great use of dramatic effect. France benefited greatly from his early rule and, but for the Belgium entanglement, which made war inevitable, he might have left behind him a firmly established dynasty instead of a splendid tradition.

It is hardly too much to say that most of the benefits of the Revolution were secured during Bonaparte's Consulate; but the Emperor's wars left France permanently weakened. Napoleon's genius in using other men may be measured if we compare his lasting legal and financial reforms carried out by Cambacérès and Gandin, his early success in diplomacy during Talleyrand's tenure of office, the army organization of Carnot and the staff work of Berthier on the one hand, with his diplomatic blunders after Talleyrand's dismissal and the lamentable confusion of details during the Waterloo campaign. Talleyrand certainly foresaw failure from the time of the invasion of the Peninsula; and it seems almost as though Napoleon's genius had burnt out its greatness when he reached middle age. At the end only cleverness in epigram remained.

An unintentional result of his conquests was the eventual founding of the modern states of Italy and Germany, for strong national feeling in both these countries was originally aroused by resentment of Bonaparte's domination.

NAPOLÉON II. The only son of Napoleon Bonaparte. See REICHSSTADT, DUKE OF.

NAPOLÉON III, CHARLES LOUIS NAPOLÉON BONAPARTE (1808–1873). Emperor of the French and nephew of the great Napoleon I. He was born in Paris, 20th April, 1808, the son of Louis Bonaparte, King of Holland, and Hortense, daughter of Napoleon's wife, Josephine Beauharnais. His youth after the overthrow of Napoleon, in 1815, was spent with his mother in exile, but the greatness of the Bonaparte family was kept ever before him, and from the time he was twelve years

old, he seems to have had dreams of empire. A thoughtful, serious boy, he made excellent progress in his studies, and might have been content to become a scholar and man of letters had he not felt that the tradition of his house demanded more of him. When the Duke of Reichstadt, Napoleon's son, died in 1832, Louis Napoleon felt more certain than ever of his destiny, and began to lay plans to achieve it, though still compelled to live in exile.

In 1836 he became convinced that the government of Louis Philippe was weak and unpopular, and attempted to stir up the garrison at Strasbourg to revolt and support his claims. The result was a ludicrous failure, and he was sent to America, without being subjected to trial. On his return in the next year, he went to live in London, but kept in close touch with affairs in France, and in 1840 made another attempt against Louis Philippe. This time he was sentenced to life imprisonment, but escaped, not at all discouraged in his ambition.

When the Revolution of 1848 broke out, he returned to France, but was compelled by the distrust of the provisional government to leave the country. Later in the same year, he returned, having been elected to the National Assembly by five departments, and in December was elected its president. For a time the president and the assembly seemed to work in harmony, but mutual distrust arose, and in December, 1851, Louis Napoleon ended the contest in his own favour by a sudden show of military force. Elected President of the republic for ten years by an overwhelming majority, he forced the people to concur the next year in the change from republic to empire, and he at length saw his dreams realized when he was crowned as Napoleon III. In the next year, he married Eugénie-Marie de Montijo, the marriage being prompted by affection rather than by ambition. She lived until 1920.

Napoleon III tried to gain favour in France by adding territory to the empire, and set out on an aggressive foreign policy. France, therefore, took a leading part in the Crimean War as the ally of England and Turkey against Russia, and espoused the cause of Italy in the struggle against Austria. Napoleon led the French armies and, though he proved to be no general, had a share in the victories of Magenta and Solferino. The treaty which he concluded at Villafranca with Austria was selfish, in that it neglected the interests of Italy and considered only France, which received the provinces of Nice and Savoy.

Napoleon next attempted to set up a "Latin and Catholic" empire in Mexico, and took advantage of the American War of

Secession to place the Archduke Maximilian on the throne of that country. He soon found, however, that he was encroaching upon the principles of the Monroe Doctrine, and the project ended in failure. After the Seven Weeks War between Prussia and Austria, Napoleon began to regard Prussia as the natural enemy of France, and to look forward to a contest between the two countries. Actual war broke out in 1870. Napoleon led the French forces in the short but



NARCISSI
Photo: Carters

decisive Franco-German War, was captured at Sedan on 2nd September, and subjected to imprisonment in Germany. His wife and son fled to England, and there, after peace had been made in 1872, Napoleon was allowed to join them. His death occurred at Chislehurst in Kent. His son, the Prince Imperial, as a young man served with the British Cavalry in the Zulu War. He was killed when a small detachment was ambushed by the Zulus.

NARBADA. A variant of the name *Nerbudda* (which see).

NARCISSUS, *nar sis' us*. In Greek mythology, son of Cephissus, the river god, and Leiriope, a nymph. Narcissus was a handsome lad, vain of his own beauty, and indifferent to beauty in others. Echo, a nymph and a favourite of the gods, was so wounded by his rejection of her love that she faded away until only her beautiful voice remained. The gods, angered by

Narcissus' coldness and Echo's death, caused him to fall hopelessly in love with his own image, mirrored in a spring. Fascinated by his own face, he bent unceasingly over the spring until he, too, died and was changed by the gods into the flower that bears his name.

NARCISSUS. A large genus of popular spring flowers which grow from bulbs; the species are native to the Old World. There are various types of these flowers. To one division belong those kinds in which the trumpet in the centre of the flower is the same length as the petals. *Daffodils* (which see) are long-trumpet narcissi. *Jonquils* (which see) are short-trumpet narcissi.

The best-known variety is the *poet's narcissus*. It produces a single, wide-open blossom on each stalk, the white petals surrounding a short, yellowish tube with a crinkled red edge. A multitude of differing types have been produced by hybridization.

Scientific Name. Narcissi belong to the family, *Amaryllidaceae*.

NARCOTIC, *nar kot' ik*. Certain substances that have a marked effect upon the nervous system, producing insensibility to pain, stupor, sleep or coma, according to the dose. The term is derived from the Greek word for "to make numb." Opium (which see), Indian hemp (hashish), belladonna, hyoscyamus (the leaves of henbane), chloral, cocaine, tobacco, alcohol (in strong doses), and certain drugs derived from coal tar products act as narcotics. When a narcotic is given in sufficient quantity to cause sleep or coma, it is called a *hypnotic*; the term *anodyne* signifies a drug that relieves pain by numbing the nerves. All these drugs are used with benefit in medicine, but there is some danger of the formation of a drug habit.

The campaign against the illegal distribution of narcotics is described under OPIUM. See also CHLORAL; COCAINE; HASHISH; MORPHINE.

NARD. See SPIKENARD.

NARTHEX. The name of the large vestibule or porch at the entrance of a building used for religious purposes. In the early days of the Church the porch or vestibule was just inside the main entrance to the Church, and was used by those who had not yet qualified for full membership. Occasionally modern churches have a narthex which consists of a lean-to porch, either the whole width of the church, or only the width of the nave. This is always at the west end of the church. The narthex of to-day has none of the religious significance attached to the corresponding part of the ancient churches.

NARWHAL, *nar' wdl*. A large mammal found in Arctic seas and belonging to the same order as the whales. The male narwhal

has a spiral ivory tusk growing out of the left side of the head. In some cases, there are two of these tusks, each of which is the outgrowth of a tooth in the upper jaw. Otherwise, the animals are toothless.

The length of the narwhal is from 12 to 15 ft., the tusk being from 6 to 10 ft. in length, and hollow nearly to the point. The



NARWHAL
Photo: Berridge

body colour is dark grey above and white below, with darker patches on the sides. The head is short and rounded, and there is no dorsal fin.

These animals feed on fish and molluscs, and are usually found travelling in herds. Oil is obtained from the blubber, and the ivory and skins are made into tools and other useful articles.

Scientific Name. The narwhal belongs to the family *Delphinidae*. It is classed as *Monodon monoceros*.

NASEBY, *nayz' be*, **BATTLE OF**. The battle which decided the issue of the Civil War between Charles I and Parliament. The conflict took place on 14th June, 1645, in the parish of Naseby, in Northamptonshire. The Parliamentary army was commanded by Cromwell and Sir Thomas Fairfax. Prince Rupert, at the head of the Royalist cavalry, routed Ireton's troops, but his pursuit of them carried him far from the main battle. Meanwhile, Cromwell's cavalry had attacked

the enemy's rear, while Fairfax in the centre held his ground, and gradually the Royalist infantry separated into small groups which surrendered one after another.

NASH, BEAU. Richard, better known as Beau Nash, was a famous dandy of the Georgian period. He was born at Swansea, 18th October,



"BEAU" NASH
(National Portrait Gallery)

1674, and although in turn soldier and lawyer, earned a precarious living by gambling. About 1704 he went to Bath, where he achieved fame as a social organizer

and leader of fashion. He died in comparative poverty, 3rd February, 1762.

NASH, PAUL (born 1889). A British artist. Educated at St. Paul's and the Slade School, he was later for a time instructor in design at the Royal College of Art, South Kensington. He was an official artist during the World War, and attracted considerable attention with an exhibition of his paintings made on the Western Front. Primarily a landscape painter, he has executed interesting woodcuts and book illustrations.

NASH OR NASHE, THOMAS (1567-1601). One of the contemporaries of Christopher Marlowe, and himself a dramatist of some importance in the reign of Queen Elizabeth. Nash, however, is more remarkable as a writer of satirical prose. A literary quarrel with Spenser's friend, Gabriel Harvey, prompted him to write, among other pieces, the lively *Have with you to Saffron Walden* (Harvey's birthplace). Of his other pamphlets the best known are *Pierce Penniless* and *The Unfortunate Traveller*. The first is a diffuse satire on luxury; the second, an exposure of the corruptions which resulted from the contemporary craze for foreign travel, may be regarded as a forerunner of the picaresque novel. Nash is a rambling writer, but he has some passages of delightfully vigorous prose.

NASHVILLE. See TENNESSEE.

NASMYTH, nay' smith, JAMES (1808-90). The inventor of the steam hammer; born in Edinburgh. His invention was actually completed in 1839, but a patent was not taken out for it until 1842. See STEAM HAMMER.

Many improvements in machinery are due to the ingenuity of Nasmyth, while he designed many entirely new appliances, among which were a planing machine, a nut-shaping machine, a steam pile-driver, and various hydraulic machines. He is also credited with the idea of using a submerged chain to tow boats on canals and rivers.

NASSAU, nas' aw. Capital of the Bahamas (which see).

NASSAU, HOUSE OF. Drutwin (d. 1076) is regarded as founder of the family. Walram (d. 1198) became Count of Nassau and a vassal of the Empire. His grandsons divided their lands, Walram, the elder, taking the territory on the right bank of the River Lahn. His descendants remained the rulers of his lands, or of portions of them, until 1866, when Adolf of Nassau-Weilburg, Duke of Nassau, supported Austria against Prussia, by which country his state was annexed.

In 1544 died René, Prince of Orange, bequeathing his principality to his cousin William of Nassau-Dillenburg, the descen-

dant of Otto, younger brother to Walram. This William (see WILLIAM OF ORANGE) became Stadtholder of Holland, which he had led in the struggle for freedom against Spain. In 1584 he was succeeded by his eldest son Philip William, who died unmarried in 1618. During these years the control of affairs had been in the hands of Johan van Oldenbarneveldt (1547-1619), a follower of William the Silent. He aided the rise to power of Maurice of Nassau (1567-1625), the younger brother of Philip William. The young prince proved to be a brilliant general, and for years he commanded the Dutch forces. The truce of 1609 caused dissension between the statesman and the soldier, later embittered by religious differences. In 1618 Maurice succeeded his brother as Prince, and a year later Oldenbarneveldt was beheaded. On the death of Maurice, his youngest brother, Frederick Henry, succeeded and showed great ability in council and in the field. He died in 1647. His son William II died of smallpox three years later; he had married Mary of England, daughter of Charles I, and his son, William III, was born shortly after the Stadtholder's death (see WILLIAM III OF GREAT BRITAIN). William III left no children. The present representatives of the House of Nassau are the

English gardens. One is a trailing or climbing annual, whose brightly coloured blossoms of varying shades of yellow, orange, or red are very effective in flower borders. Another popular kind is the dwarf, or "Tom Thumb." The nasturtium flower has a very interesting structure. There are five sepals, the three upper ones being so joined as to form a long spur which holds the nectar. There are likewise five petals; the three lower ones are somewhat away from the two upper, and grow on long, fringed claws. The leaves are almost round, and grow close together, often hiding the flower. The unripened seeds are pickled in vinegar and eaten as a substitute for capers.

Annual nasturtiums grow readily from seed sown rather late in spring. Many beautiful double varieties have been produced by culture, and on sunny but poor soil the plant grows well and is very hardy. The new scented kinds are as reliable as any.

Scientific Name. Nasturtiums belong to the family *Tropaeolaceae*. The best-known garden species are *Tropaeolum majus*, the climber, and *T. minus*, the dwarf.

NATAL. With an area of 35,284 sq. miles Natal is the smallest province of the Union of South Africa, being 7 per cent of the total area. Since 1897 Natal has embraced Zululand (10,427 sq. miles). Most of the country is rugged and mountainous, rising from the coast regions to the interior, where the Quathlamba and Drakensberg Ranges mark the frontier with Basutoland, the Orange Free State and the Transvaal. In these ranges there are peaks over 11,000 ft. in height. Rivers dissect the country into deep valleys. Zululand in the north is relatively low-lying. Most of the coast line is smooth, and harbours, with the exception of Durban, are poor.

Climate, and consequently production, vary much owing to the differences in elevation. The coast regions are warm, with a heavy summer rainfall and tropical crops. The midland areas between 1000 and 4500 ft. are cooler and somewhat drier, and have a veld-like vegetation of open grassland with acacia bushes (wattle). This is largely a grazing area. At higher elevations the climate is cool and wet, and there are rich meadow lands and areas of forest.

Population. The native population of Bantus numbered 1,139,804 at the census of 1921; the Indian population in the same year was 141,649, and the half-caste or coloured, 11,107. In 1936 the European population was 189,519, Bantus, Indians and half-castes or coloured numbered 1,542,880. Immigration to Natal is small. Indians who were formerly introduced for plantation work are now restricted, and many who failed to conform



NASTURTIIUM
Photo: Sutton & Sons

Royal House of Holland, descendants of John, brother of William the Silent.

NASTURTIIUM. The common name of a genus of South American plants, two species of which are established favourites in

to the required standard of living were repatriated in recent years. Bantu people are mainly labourers. The European population has trebled in the last fifty years. Education is controlled by the provincial government for



TOWN HALL, LADYSMITH, IN 1900
Showing the damage sustained during the siege
a year before.

Photo: South African Railways

the present. There are State-aided schools both for Europeans and for native children, and very few European children receive no schooling. Technical and vocational education is controlled by the Union. A site near Durban has been set apart for a University.

Towns. Durban (population 151,642, of whom about half are Europeans) is the chief port, with an artificially improved harbour and railway connection. It has soap, furniture and explosive works. Pietermaritzburg (population, 36,023, including 21,566 Europeans), the capital, is an inland town with rail connection with the Cape Province and the Transvaal. It has brewing, tanning and

leather works. Newcastle (population about 4500), at the foot of the Drakensberg Range, is a coal-mining centre with iron and steel works. Ladysmith (pop. 6650) is an important railway junction and trading centre.

Products. The low coast regions produce sugar, maize, tropical fruits, cotton and tobacco; wattle is grown for tanning purposes. Tea is giving way to sugar. Further inland, on higher ground, cattle, sheep, and temperate cereals become more important.

Among minerals, coal is important and of fairly good quality. A third to a half of the coal production of the Union is from Natal. Iron ore occurs in quantities; there is also graphite and gold in Zululand.

History. Natal was discovered and named by Vasco da Gama on Christmas Day, 1497. Not until 1823 and later years were attempts made, unofficially, to found British settlements, they met with opposition from Zulu chiefs. The Boers began to invade Natal in 1835 and proclaimed a Dutch Republic in 1840. They were, however, turned out, and in 1843 Natal was proclaimed a British colony annexed to Cape Colony. It became a separate colony in 1856, and obtained responsible government in 1893. In 1910 the colony was merged in the Union of South Africa. See SOUTH AFRICAN WAR.

NATHAN. A Biblical character. See II Samuel, vii, xii etc.

NATIONAL ANTHEMS. The name of the author and composer of *God Save the King*, the national anthem of the United Kingdom is not definitely known, but both words and music are generally attributed to Henry Carey, a popular composer who is supposed to have written them about 1740. A general belief is that he adapted the anthem from earlier forms, possibly from an air composed by Dr. John Bull, organist to James I. It was sung frequently in London in 1745, and later was adopted in Germany and Denmark by continental composers. The French



NATIVE LIFE IN NATAL

Left to right: Zulu warrior; Dance; Zulu mother and child.

Photos: Cherry Kearton

national anthem, the *Marseillaise*, was composed in 1792 by Rouget de Lisle, a young officer who wrote both the words and the music. In Germany the national anthem is *Deutschland über Alles*, and the song of the Nazi revolutionary movement is the *Horst Wessel*. The Russian national anthem, *Bozhe Zaria Chrany*, has been replaced by the *Internationale*. In the United States, *The Star-Spangled Banner* and *Hail, Columbia* are the official songs.

NATIONAL DEBT. The total of the debt owed by a nation, contracted as a result of wars, or for territorial expansion, or to meet deficits when receipts from all usual sources do not equal expenditure.

Nations began to contract public debts over two hundred years ago, and in this Great Britain led. Previous to 1688, the King gave his personal pledge, secured by his jewels, for its repayment; but the revolution of that year made necessary other devices, and the credit of the whole nation was substituted, based upon Acts of Parliament. Other nations soon began to meet emergencies in the same manner, and to-day, practically every civilized country has a standing indebtedness.

Political economists have uttered warnings because of the continual increase in public debts. Adam Smith prophesied before the year 1790 that the enormous obligations they had assumed would eventually ruin European countries.

The justification for borrowing to meet expenditure is that posterity should help to pay for costs incurred for its benefit. Actually, it would be almost impossible, without crippling taxation, to meet these liabilities out of current income.

Britain's Debt. In Britain, as elsewhere, wars have been the main cause of the increase in the National Debt. In 1688 the Debt was only £664,263, but by 1697 it had risen to £21,250,000, owing to the wars of William III. The Duke of Marlborough's activities accounted for an increase of about £33,000,000, and the Spanish-Austrian wars for about £32,000,000. The Seven Years War, 1756-1763, raised the total by about £60,000,000, and the American Revolution by about £120,000,000. The most costly war previous to 1914-1919 was the struggle with Napoleon, which added about £380,000,000 to the Debt, although 64 per cent of its cost had been raised by taxation; the total in 1816 was £900,000,000. The Crimean War, 1854-1857, added a further £35,000,000, but the total was reduced to £635,000,000 by 1899, when the Boer War broke out and was responsible for another increase of about £162,000,000.

The state of the National Debt since 1914

is shown by the following figures, taken as on 31st March of each year—

£ millions		£ millions	
1914 . . .	661	1923 . . .	7812
1918 . . .	5921	1932 . . .	7646
1919 . . .	7482	1933 . . .	7859
1920 . . .	7876	1934 . . .	8030
1921 . . .	7623	1935 . . .	8052
1922 . . .	7721	1936 . . .	7796

The Funded and the Unfunded Debt. The National Debt of Great Britain is of two kinds. The permanent debt, which is not to be repaid, is known as the *Funded Debt*, on which only the interest is due at the specified times. A notable example of this is "Consols," bearing interest at 2½ per cent. Other borrowings, due to be repaid at any time between two fixed dates, are known as the *Unfunded Debt*. National Savings Certificates and Treasury Bills come into this category.

Reducing the National Debt. The post war cost of retaining Britain's National Debt was practically £1,000,000 per day until a fall in the general rate of interest enabled those loans falling for redemption to be converted into other loans bearing a lower rate. The cost in 1926-27 was £313,700,000, whereas for 1935 it had been reduced to £210,613,177.

Various remedies were suggested, including repudiation of the debt, and a Capital Levy. Less drastic and more economically sound measures have been adopted to effect a reduction.

1. *Terminable Annuities* are offered in exchange for a capital sum. The annual payment is a charge to be met out of Government revenue, but in time a portion of the Debt is redeemed.

2. *Surplus Revenue* of any year can be applied to Debt redemption. The outcry for relief in taxation, however, often stays the hand of the Chancellor of the Exchequer in his good intentions.

3. *Purchase.* Often it is possible to effect a saving by purchases, on behalf of the Government, of stocks on the Stock Exchange when prices are low.

4. *Sinking Funds.* As early as 1786 Pitt experimented in making provision annually for a sum of £1,000,000 to be set aside towards the reduction of the Debt. In this way the National Debt Commissioners came into being. In 1875 the New Sinking Fund was established by Sir Stafford Northcote for a sum (£28,000,000, but often altered) to be set aside each year for Debt redemption. War emergencies in 1914 caused a temporary cessation, but 1923 saw the return of the principle when the sum was fixed at £50,000,000. The Colwyn Committee, re-

porting in 1927, suggested £75,000,000 ultimately rising to £100,000,000 per annum.

Winston Churchill, in his budget of 1928, instituted the principle whereby the debt charge, including interest and sinking fund, should be stabilized at £355,000,000 per annum, but this principle has not been adopted by his successors in the Chancellorship.

In Other Countries. *The United States of America* debt was only \$75,463,746 in 1791, but by 1835 it had been almost paid off. The Civil War (1861-1865), however, raised it \$2,755,764,000. The construction of the Panama Canal and the Spanish-American War were costly undertakings, but the World War left America with a total of \$25,482,034,000 in 1919. In 1935 the debt was \$28,700,000,000. Canada assumed the liabilities of the separate colonies, which were \$92,500,000 in 1867, but, like other parts of the British Empire, Canada's later debt was increased by the construction of public works, canals and railways, and not by war expenditure until 1914-1919. There was a burden of \$2,417,437,696 in 1925, since when there has been some reduction.

France had the largest debt of any country in the world in 1914. The World War embroiled over twenty nations and their debts increased enormously. At pre-war currency values Germany owed after the War the equivalent of £396,895,000,000; France, £13,144,200,000; Italy owed about £4,593,200,000; and Russia £4,913,000,000.

NATIONAL GALLERY. See LONDON.

NATIONAL GOVERNMENT. The term signifies a government representative of all political views, usually formed in a time of crisis, as distinct from a government representative of only one political party. Such a government—though this was styled a Coalition Government and not a National—was formed during the World War in Britain, when Mr. Lloyd George formed an Administration consisting of ministers drawn from the Conservative, Liberal and Labour Parties. Following an acute financial crisis in the summer of 1931, Mr. Ramsay MacDonald, then Prime Minister of a Labour Government, resigned office and created a National Government of which he became the Prime Minister. He failed to obtain for it the support of the Labour Party, but associated with him were three other members of the Labour Cabinet, these being Mr. Philip (afterwards Lord) Snowden (Chancellor of the Exchequer), Lord Sankey (Lord Chancellor), and Mr. J. H. Thomas, for many years a prominent leader of the Trade Union Movement. The Conservative Party was represented in the Government by its leaders, including Mr. Stanley Baldwin, a former

Prime Minister, and the Liberal Party was represented, among others, by Sir John Simon and Sir Herbert Samuel. The main body of the Labour Party went into Opposition. Socialists who supported the National Government formed themselves into a National Labour Group, and a National Liberal Group was also created.

After Mr. Snowden had introduced an emergency Budget, economies had been instituted, and the Gold Standard suspended, Parliament was dissolved. At the General Election, the National Government won an overwhelming majority. Mr. MacDonald continued as Prime Minister, but Mr. Snowden, becoming a member of the House of Lords, was succeeded as Chancellor of the Exchequer by Mr. Neville Chamberlain. Subsequent disagreement with the Government's tariff policy led to the resignation of Sir Herbert Samuel, a Liberal leader, and ultimately one section of the Liberal Party, led by Sir Herbert, went into Opposition. Mr. Baldwin became Prime Minister in June, 1935, Mr. MacDonald continuing his membership of the Cabinet as Lord President of the Council. The National Government was again successful at a general election in November, 1935, though with a reduced majority. With the withdrawal of Lord Sankey from the Lord Chancellorship, and the resignation of Mr. J. H. Thomas for personal reasons in May, 1936, the only remaining prominent Socialist supporter of the National Government was Mr. Ramsay MacDonald.

NATIONAL INSURANCE. The British State insurance schemes date from the passing of the first National Health Insurance Act in 1911. The object of the Act was "to provide for insurance against loss of health, and for the prevention and cure of sickness, and for insurance against unemployment, and for purposes incidental thereto." There are now several Acts of Parliament covering health, pensions, and unemployment insurance. The Acts are compulsory and universal in their application to the working classes. They are contributory by employers, workpeople, and the State, and are worked principally through "approved societies." Contributions are payable in the first instance by the employer, who is called upon to affix stamps of the correct value to the insurance cards of the employees, and he is authorized to deduct from the employees' wages the amounts representing their share of the contributions. See HEALTH INSURANCE.

NATIONALITY. Although a nation is not the same as a State, the term "nationality" is often used, both in law and in common language, to express membership of a State.

Each State defines for itself by its municipal law what classes of persons it will regard as its subjects. Most States claim as subjects the children of their subjects, even if born abroad, and some also claim the children of aliens, if born in their territory. Thus it may happen that a person is claimed as a subject by two States, the State in whose territory he was born and the State to which his father belonged. The law of some States gives such a person a right of choice when he reaches years of discretion. Except in the United States of America, a wife acquires the nationality of her husband.

British Nationality. The following are recognized as British subjects (1) any person born within His Majesty's dominions or on board a British ship (but not on board a foreign ship in British waters), whether his parents were British or foreign.

(2) Any person born out of His Majesty's dominions if his father was a British subject and he fulfils one of the following conditions: (a) his father was born within His Majesty's allegiance, (b) his father had been naturalized or had become a British subject through annexation of territory, (c) his father was at the time of his birth in the service of the Crown, or (d) the birth was registered within one year at a British Consulate. See also NATURALIZATION.

NATIONALIZATION. The acquisition by a State of any industry, trade, or service with the object of controlling and administering it. By this socialization of economic activity, profit, if any, is passed to the State instead of to individuals. Complete socialism would entail state ownership of all industries and services, but even those States where the capitalist system is still firmly entrenched have entered upon the nationalization of activities considered essential to the well-being of the nation. Such services are transport, education, power, postal facilities, telephones, telegraphs, etc. A modified form of nationalization is municipal ownership (which see), and in Britain national or local interests are safeguarded also by those concerns operated as public utility corporations, e.g. the Central Electricity Board, the Port of London Authority, and the Metropolitan Water Board, where the profit is limited to a reasonable return on the capital invested, the services being rendered at the lowest possible charge.

Some undertakings, however, may be forced into national ownership by economic conditions. For example, British railways and coal mines present the problem of being essential to national interests and yet allowing only a small margin of profit. The nationalization of such interests would not be profitable to the Exchequer, and yet they

cannot be allowed to lapse for national reasons. In the case of nationally-owned coal mines, a mine costly to work could still continue when costing is on the broader basis of the whole industry, and so avoid severe labour dislocation, and labour remuneration—a frequent cause of stoppage in this industry—could be standardized and not left dependent on the success of each individual enterprise.

Nationalization has its disadvantages, of course. The stifling of private enterprise may be very harmful where development is needed, and bureaucratic administration may become uneconomic.

NATIONAL MARK. The trade emblem authorized by the Ministry of Agriculture and Fisheries to denote that the commodities so marked are graded and packed according to standards laid down by the Ministry. These standards may refer to size, weight, quality, quantity, colour, method of packing, or any other factor, or combination of factors, in the production and marketing of specified goods. Included in the National Mark scheme are apples, pears, tomatoes, cucumbers, eggs, potatoes, beef, wheat, flour, malt products and other agricultural produce. The National Mark serves not only as a certificate of origin but also as a certificate of quality. Beef, for instance, is graded and labelled in three qualities, Select Home Killed, Prime Home Killed, and Good Home Killed.

NATIONAL PARKS. See PARKS.

NATIONAL RECOVERY ACT. An important measure of the "New Deal" by which President Roosevelt attempted to restore economic prosperity to the United States, after the depression of 1930-32, was the National Industrial Recovery Act. Faced by a situation in which trade was dwindling with increasing velocity, ever decreasing wages, collapsing prices, and rapidly increasing numbers of unemployed, the President, in June, 1933, created the National Recovery Administration, with General Johnson at its head. The objectives were to stem the downward trend of industry, to advance prices, to reduce the hours of labour, and to achieve higher wage rates. To permit price fixing by agreement, the Sherman anti-Trust laws were suspended in their most important provisions for the firms that came under the "codes" of N.R.A. Section 7 of the Act legalized collective bargaining, thereby giving greater recognition to the trade union movement in the United States. The clause declared that Labour should have the right to organize freely, and to be represented in collective bargaining by spokesmen of its own choice. Under a system of "industrial codes," the intention was to establish a

minimum wage throughout the country, and to make corresponding increases in the rates of pay for all workers, excepting those receiving, roughly, more than three times the proposed minimum. This scheme, however, met with only partial success, and generally the plan had to be abandoned, but many thousands of workers, especially those receiving less than twelve dollars a week in the North, and eleven dollars in the South, received advances. This led to some increase in prices, and there was general criticism that N.R.A. had raised prices without raising purchasing power. Further criticism was that the permitted price-fixing was giving the larger businesses the opportunity of crushing the smaller businesses. President Roosevelt, however, in his message to Congress on 20th February, 1935, claimed that the Act had been the "biggest factor in giving re-employment to approximately 4,000,000 people."

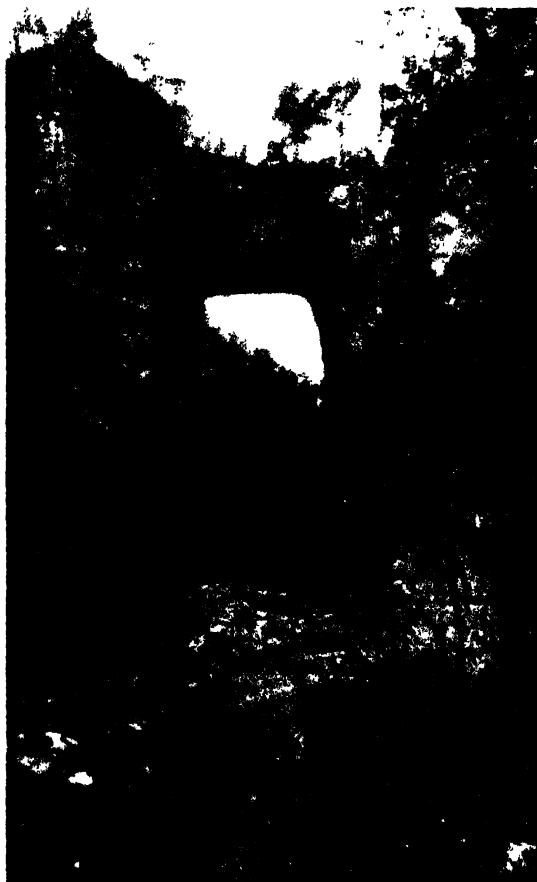
N.R.A. came to an end as the result of an adverse legal decision given on 27th May 1935, by the Supreme Court of the United States. Though due to expire on 16th June, 1935, the Act, in many of its provisions, would certainly have been extended until 1937, but the Court's decision in the Schechter Poultry Corporation case destroyed practically the whole of its activities. The Supreme Court held that Congress had not the right to delegate to the President what they considered to be the power to create legislation. N.R.A. was finally terminated as an independent body on 24th December, 1935.

NATIONAL SAVING. In Great Britain this is estimated to average approximately £450,000,000 a year, but this figure includes expenditure on new houses and furniture. It constitutes 10.9 per cent of national income. The average saving per family is estimated at £36 a year. Small savings are chiefly effected through Post Office Savings Bank, Trustee Savings Banks, National Savings Certificates, Building Societies and Co-operative Societies. The National Savings Movement is the outcome of the National War Savings Movement, founded to encourage savings during the World War. There are now over 35,000 National Savings groups in England. Estimates of national savings in the past century give these at £40,000,000 a year between 1820 and 1840, rising to £80,000,000 a year by 1860, and £120,000,000 a year in 1880.

Professor Bowley and Sir Josiah Stamp, in 1926, estimated the total savings of Great Britain in 1911 at £330,000,000, of which £230,000,000 were invested at home and £100,000,000 invested abroad.

NATIONAL SAVINGS CERTIFICATES.

War Savings Certificates introduced to raise finance for the conduct of the World War were in effect bills issued at a discount. The investor bought for 15s. 6d. the right to receive £1 at the end of five years. But he could call for the return of his money when he pleased and would obtain, after the first year, interest in addition. Interest was earnable up to ten years, and was not liable to income tax; but, in order to preserve their purpose of reaching the small investor only, no one might hold more than £500 in certificates. In 1920 the name of the certificates was changed to "National Savings Certificates"; and the price was raised to 16s. as



NATURAL BRIDGE 215 FT. HIGH AT ROANOKE, VIRGINIA
Photo: U. & U.

from 1st April, 1922. On 1st March, 1935, the price of the Sixth Issue was reduced to 15s.

The name is a little ambiguous, for from the point of view of the community, an increase in National Savings Certificates denotes an increase in National Debt. The savings are, as regards the nation, borrowings; and, like all borrowings, they entail two disagreeable features, present payment of interest and ultimate repayment of principal.

NATURAL BRIDGE. When a mass of earth or rock spans a stream, gorge, or other depression in such a way as to form an arch, we have the geological formation known as a natural bridge. These bridges are often the result of water working its way slowly through loose soil or soft rock beneath a harder layer, and gradually washing out the softer material.

NATURAL GAS. Gas which issues from crevices in rock. It has a higher percentage of methane than artificial gas and produces from two to three times the amount of heat per unit, but it does not give as good light.

Natural gas occurs in regions where petroleum is found, and it is procured by sinking wells (see WELL-BORING). The wells vary from a few hundred to 6000 or more feet in depth. The pressure in a new well may be as high as 1000 lb. to the square inch, but usually it is less—500, 400, and 250 lb. and under being common. As the gas continues to flow, the pressure decreases, and the flow from some of the oldest wells has ceased, showing that the gas is a product of some past geological age. There is record of the use of natural gas in a Parsee fire temple near Baku (Asia) as early as the seventh century.

Production and Uses. The extraction of natural gas constitutes to-day an important industry in several parts of the world, notably in Canada and the U.S.A. By a recently discovered method, petrol is manufactured from natural gas. Over 21,500,000 thousand cubic feet of natural gas is the average annual yield in the Dominion. Two-thirds of the amount is produced in Ontario, and one-third in Alberta.

NATURALIZATION. The legal process by which a person becomes a citizen of a country other than that of his birth. Naturalization occurs automatically when territory formerly belonging to one State is annexed by another, and, save in the United States of America, when a woman marries she acquires the nationality of her husband. In other cases naturalization can be effected only under the conditions and through the forms prescribed by the law of the particular state concerned. Most states, including Britain, provide that one of their subjects who becomes naturalized elsewhere shall

cease to owe allegiance to them, but states where military service is compulsory do not, as a rule, allow men without special permission to renounce their allegiance until they have performed their service, and, if they emigrate before then without permission, they are held still liable to military service and often to criminal punishment, if they ever return.

In Britain, a certificate of naturalization may be granted by the Secretary of State to an alien who fulfils the following conditions: (1) He must either have resided in the United Kingdom for the year immediately preceding his application, and in some part of His Majesty's dominions for at least four of the preceding seven years, or have been in the service of the Crown for five of the eight years immediately preceding his application. But a woman who, having lost British nationality by marrying an alien, seeks to reacquire it by naturalization after the termination of the marriage, need not show this qualification. (2) He must be of good character and have an adequate knowledge of English. (3) He must intend to continue his residence in His Majesty's dominions or his service under the Crown. Even then, the grant of the certificate is in the absolute discretion of the Secretary. If it is granted, the applicant must take the oath of allegiance before it becomes effective. The certificate may also confer British nationality on the children of the applicant who are under age.

British naturalization may be applied for on the same terms in other parts of the British Empire as well, and a self-governing Dominion has also the power to grant "Dominion naturalization" which will be valid only within that particular Dominion.

The whole theory of naturalization is a modern development. Until the nineteenth century, a man remained a citizen of his native land, regardless of where he lived. One of the causes of the war of 1812 was the British impressment of seamen who were of British birth but of American citizenship. It was not until 1870 that Great Britain formally renounced the old principle, and recognized the right of individuals to transfer their allegiance.

NATURAL SELECTION. The theory, first advanced by Darwin, that "new species may result from the selective action of external conditions upon the variations from their specific type which individuals present." When Darwin's book, *The Origin of Species by Means of Natural Selection, or The Preservation of Favoured Races in the Struggle for Life*, came out in 1859, it advanced a theory as to how all living things came to have their present form.

Selection by Life and Death. There are so many more individuals born than can possibly survive, because of limitations of space and food, materials for shelter, and so on, that the very slightest advantage of one over the other may keep the one alive and kill the other. Thus nature prevents overcrowding in the world by killing off the weak, or those forms which are not adapted to the conditions under which they must live if they survive, and by favouring the others.

Young of the same parents, in all forms of life, differ more or less widely. These variations, slight as they are, tend to be inherited. If the variation is such that it hinders or incapacitates, the species becomes extinct, if it is in the direction of increased fitness, it becomes a characteristic of a surviving species. So it seems that all forms of life are fighting, usually without realizing it, for a chance to live. This fight has given rise to two phrases, "the survival of the fittest" and "the struggle for existence," by which Darwin meant not only that the individual must be successful in maintaining life under his conditions, but that he must leave young, otherwise, his species will die out.

Darwin admitted that the theory is hard to prove; it is only by observation of present forms, and their fitness for their environment, that we are able to accept it. See EVOLUTION.

NATURE, BALANCE OF. Plants and animals are completely interdependent on account of their modes of feeding.

The plant absorbs carbon dioxide, an atmospheric gas, through the leaves, and water and salts through the roots, and builds them up into sugar, starch, cellulose and other materials, liberating oxygen into the atmosphere at the same time. This building-up process requires a large amount of energy, which is obtained from sunlight by means of chlorophyll, the green colouring-matter common to all leaves.

All plant products are built up on similar lines. Starting with carbon dioxide, water and a few simple salts, such as nitrates, the plant makes perfumes, colouring-matters, vitamins, drugs, oils, resins, as well as animal food in abundance.

Plants, however, would soon denude the air of carbon dioxide, and the soil of salts, were it not for complementary animal and bacterial processes.

Animal metabolism involves mainly the absorption of the two plant products, food and oxygen, and their ultimate conversion into waste materials, viz. carbon dioxide, water, urea, salts, etc. In this way, the animal returns to the atmosphere and soil precisely those materials required by the plant.

The nitrogen cycle is complicated by the fact that both plant and animal waste

nitrogen is combined with hydrogen, and, as such, is useless to the plant. Bacteria, however, ultimately convert it into nitrates, i.e. nitrogen combined with oxygen, in which form the plant can readily absorb it. A certain amount of free nitrogen also finds its way into the atmosphere, but this is returned to the earth as nitrate, formed during thunderstorms, and by other processes.

This great balanced system may also be pictured in terms of energy—energy passing from its only source, the sun, through plants and animals in turn. Its downward course to a "heat death" is merely diverted; yet, as a result, plants grow and animals move, which, after all, is life itself to many simple forms.

Civilization has augmented the supply of plant food by fuel combustion, industrial fermentation, etc.

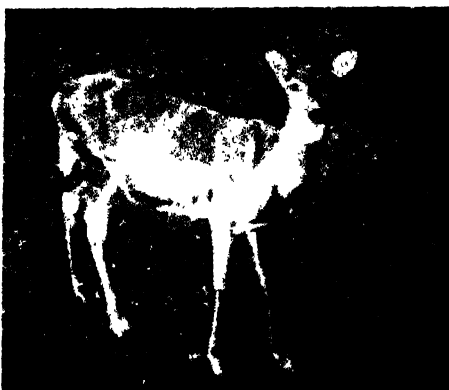
NATURE STUDY. Nature study is the study of the universe in which we dwell, and of everything that surrounds us, both living and inanimate. While modern physics speculates on the origin and ultimate fate of the universe, geology explains the shape and structure of mountain, moor and meadow, or describes the appearance and disappearance of continents and seas. Zoology and botany unravel the tangled threads of Evolution and account for the animals and plants that are found in the world of to-day. Each contains innumerable subdivisions, for this is the age of the specialist. So far has man's thirst for knowledge driven him that no one individual can to-day hope to advance the torch of truth very much further unless he deliberately restricts his sphere of activities. It will be seen that Nature study is literally the mother of the sciences.

A science like ecology largely relies for its material on many hundreds of people making quite simple observations on animals in the country. The spread of the grey squirrel is a case in point. Anybody who has seen these little aliens in a district where they have not been seen before, is in possession of a fact which may be of value to the ecologist working on the spread of this unfortunate introduction from America. Indeed, the day has now dawned when the humblest student of Nature may help in the investigation of this pest or that problem.

There can be hardly any other subject in the school curriculum that demands greater ability on the part of the teacher. It is not enough to be a walking encyclopaedia of facts. A deep love of Nature is even more important. The teacher of Nature study has one great advantage—children are so much closer to Nature than adults that they normally exhibit a deep interest in living creatures. The desire to read and to write, or to make simple arithmetical

calculations, will be greatly stimulated if the younger children are encouraged to keep a notebook in which they record their observations on, for example, the germination of seeds or the life cycle of the frog. The desire to draw, strong in most children, will be given an object if the children are allowed to illustrate their notes, in however rudimentary a manner.

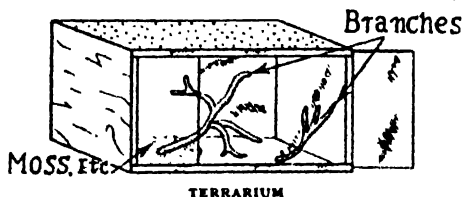
Whilst the teacher of Nature study requires to be well informed on a variety of subjects, this is the smaller part of his burden; the other is no less than the moral and



spiritual education of his pupils. The nature and origin of sex, the mystery of birth and the even greater mystery of death will be his special concern. Children are often cruel and thoughtless—it will be for the teacher of Nature study to check such inclinations. Thus, children should learn that, once they have picked a flower, they must take care of it, never allowing it to wilt because they are too tired or too busy to put it in water. In the same way, if tadpoles are brought into the classroom in a jar of water, proper care should be given them.

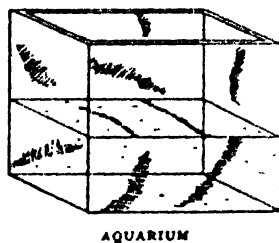
School Equipment for Nature Study. A small library is essential. The earlier children learn to use simple books of reference the better. A pair of field glasses will be useful, and a magnifying glass and one or two birds' nesting-boxes. Even if birds do not use the latter at first, bumble bees and earwigs will breed in them and wood mice make their winter nests. Further, there should be a *terrarium* or *vivarium* in which are put the frogs, toads, or lizards to be studied. For batrachians, the cage should contain damp moss (which must not become dry or wet) frequently changed, and a piece of bark or other dark hiding-place. A shallow bowl of water will be required; it should be kept from the sun.

For reptiles, such as lizards, slow-worms or grass snakes, the vivarium must be dry. A bowl of water will be necessary, as reptiles drink; batrachians do not drink. They



absorb moisture through their skin and sometimes like to sit in water. The reptiles will require a few small branches to climb on, dry moss to hide beneath and sun (not too much or too hot) to bask in. None of these animals need be fed if kept only a day or two.

An *aquarium* will be required for newts, which will readily lay their eggs in the spring; or for keeping little fish, tadpoles, water-beetles, etc. Cover the bottom with an inch of well washed and scalded sand, plant cuttings of aquatic weeds (held down, until they take root, with small stones) to fill two-thirds of the space. Fill gently with clean pond or river water (or tap water that has been exposed to the sun and air for several days). Remember the rule, an inch of fish, exclusive of tail, to each gallon of water. In a properly arranged aquarium the water will remain clear for months if dust is removed from the surface by drawing strips of newspaper across the water, and if debris is syphoned off the bottom with a



piece of rubber tubing. The depth of the water must be considerably less than the width of the aquarium. The usual position, on a window sill, is bad—the plants grow too quickly and the fish dislike the glare. Round fish globes cannot be condemned too strongly. Fish require the subdued illumination of a pond, which of course is lighted only from above.

A pond or outdoor pool is even more useful than an aquarium. An ordinary wooden tub will make, when sunk in the ground, an excellent little pool in which goldfish will readily breed and water lilies



LIFE HISTORY OF THE TOAD

The toad begins its existence in a minute egg about one-fifteenth of an inch in diameter. The mother toad deposits the eggs in long strings (see number 1), which may sometimes be seen on the spring vegetation of ponds or roadside pools. Pictures 2 to 4 show these eggs magnified. In number 5 are shown the newly hatched larvae, or tadpoles. They have no legs, but their curving tails are effective swimming organs. They breathe by gills. Numbers 6 to 12 show the various changes that take place as the young creatures develop into adult toads. Forelegs and hind legs appear, and the tail and gill tufts are absorbed. In the series 13 to 18 are shown different aspects of the fully developed toad. Number 13 is a detail of the front foot, and number 14 of the hind foot. In 15 is seen the under side of the head; number 16 is a view of the head as seen from above.

flower. Of course, a larger pond is better, but if only a corner of the playground is available, the writer strongly recommends one or two tubs. All sorts of creatures turn up unexpectedly at even the tiniest pool.

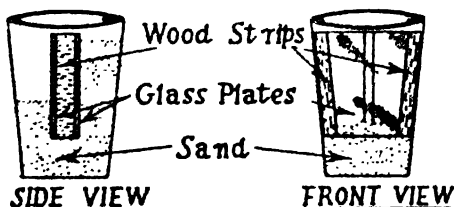
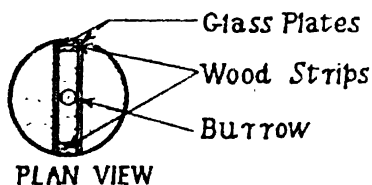


RABBIT IN SNOW

A sand table. Frequently of use, even to the older children, in demonstrating many of the principles of geology, such as coast erosion, river valley formation, etc.

Insect cages can be made by putting a lamp-glass on top of a flower-pot and covering the opening with muslin held in place with a rubber band.

Insect subterrarium, for observing those parts of an insect's metamorphosis that take place below ground, can be made of the following materials: 1. A tumbler. 2. Two pieces of glass cut to fit from just below the



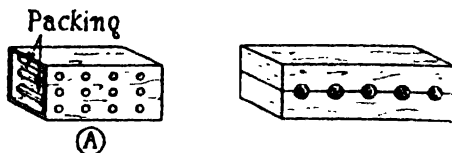
INSECT SUBTERRARIUM

top to three-quarter way down the tumbler. 3. Two strips of wood, just wider than the larva to be kept, to keep the two glass plates apart. 4. Glass cover. The diagrams explain the manner in which these are assembled.

The insect is placed in a burrow (made with a pencil) between the two plates, which should give it just room enough to move comfortably but not so much that it can pack sand between itself and the glass. The

sand may need sterilizing. Ventilation need not be considered. Loss of moisture will therefore be slight—a few drops of water added once or twice a week should be sufficient. Tiger beetle larvae and the larvae of many dung and carrion beetles, etc., can be kept, if supplied with a little suitable food, and their pupating habits observed.

Insect nesting-boxes. The red osmia (*Osmia rufa*, a solitary bee) will build in stems of elder from which the pith has been removed. These tubes can be held in wooden boxes. If necessary, the tubes can always be



NESTING BOXES

split and the life cycle worked out. The wool carder bee (*Anthidium*) and the leaf-cutter bee (*Megachile*) will also build in them, as will the solitary wasps (*Odynerus*), filling them with caterpillars, etc.

Alternatively, holes may be bored in a piece of 2 in. x 4 in. timber which is then



MALE AND FEMALE BEARS

sawn through to divide the holes, and subsequently bound together again. These nesting boxes should be fixed outside on a sunny window sill.

Ants, especially the yellow meadow ant, are easily kept in a large, flat round glass (such as preserved meats are sold in). Part of a nest may be put in the jar in the spring, to fill it three-quarters. A few small wild plants and grass, taken with the nest, should be grown. The ants will then be able to keep root and shoot aphids. The jar should stand on a square tile in a tray of water, food being put on the tile and not in the jar

The latter must, of course, be carefully watered every day or two.

Harvestmen, or "daddy-long-legs," familiar to all, are distinguished from real spiders by having a small body without a waist and enormous legs. These will live well in a cardboard box with a glass cover. They require water to drink, cooked mutton fat to eat—will also enjoy strawberries and junket. They are nocturnal, and in nature



BLACK BEAR

This is a North American species, smaller than the grizzly and less ferocious.

feed chiefly upon insects and on smaller spiders. The eggs are laid in autumn and hatch in spring.

Tadpoles, of frog and toad, must be given meat as well as green food. On the whole an occasional tiny earthworm is the best. It must be killed instantaneously by being dropped into boiling water. A larger worm is killed immediately by dashing it down on a stone or concrete surface. Chopped up and cleaned out, it can then be given to fish or tadpoles in suitable pieces. The tadpoles or larvae of newts require living prey. Take a net of fine muslin to a duck-pond and sweep it through the water near the surface. Rinse the inside of the apparently empty net in a jar of clear water and you will find the swarms of water-fleas, cyclops, etc., that are required. An island of damp moss will enable the little animals to leave the water when their transformation is complete. They are then best released, though they could be kept for a little while on greenfly.

Fish. Tiny fish, caught in any pond, may be fed as described under newt tadpoles. Larger fish require small earthworms, etc. (if carnivorous or omnivorous) and scalded



ADULT ELK

Still found in Northern forests of Europe.

vermicelli. Goldfish do well on the latter. Ants' eggs are usually unsatisfactory. Goldfish and sticklebacks will breed in quite small aquaria indoors. The pugnacious stickleback must not be put with other fish. Remember to equalize temperatures when moving fish from pond to aquarium.

Hedgehog. There is a widespread belief that the prickly pig will thrive on bread and milk. Eked out with a kitchen full of cockroaches or a garden full of slugs, it is satisfactory enough. But if kept as a pet, or



YOUNG ELK

brought indoors for observation, it will need meat four or five days a week. Cooked chicken and chop bones, with raw meat and a little soaked dog biscuit is what it needs and enjoys.

A school garden, if obtainable, will rank next in importance to expeditions into the country, for it will be not only an effective botanical laboratory, but a permanent demonstration of the interaction of plant and animal life. Food put out on a tray for birds, well beyond the reach of cats, will increase its value, as will a small patch of uncultivated ground to attract such creatures as snails or grasshoppers and other insects. A pool, however small, will add immensely to its usefulness (see above).

Expeditions into the country are all-important. Each member might carry a small tin slung round the shoulders to bring back botanical specimens, tiny animals to study, etc. If the children are broken up into small groups for a short while, and told that they must pretend to be Red Indian trackers—silent, soft-footed and keen-eyed—they will love the game.

NATURE WORSHIP. The adoration of objects and forces in nature has been a part of the religion of many peoples. The mythology of the ancient Greeks and Romans has many stories in which objects in nature are seen as gods. The Greeks, for instance, pictured the sun as a god who drove a chariot of gold across the sky. The Persians worshipped fire, and in Hindu temples to-day the sacred cobra has its devotees. The ancient Britons, Norsemen, and Slavs held the oak tree sacred as the home of a god; this belief has its counterpart in the "dryads" of classical mythology. Primitive peoples have worshipped rocks, mountains or rivers for the sake of the spirit or deity that was supposed to dwell in them. The Greek god Pan, the patron of shepherds and hunters, was later worshipped as a god immanent in all Nature.

NAUNDORFF, KARL WILHELM (died 1845). First heard of in Berlin in 1810, he claimed to be the son of Louis XVI and Marie Antoinette, and was in fact accepted by many people as the Dauphin of France. In 1833 he visited Paris and instituted a claim to the Dauphin's private property, but he was expelled from the country and spent his remaining years in Holland.

NAURU, *naw'ru*. An island in the Western Pacific in longitude 166° E., 26 miles south of the equator and with an area of 8 square miles. The island is a low plateau fringed with a narrow strip of fertile ground. There are no harbours and the central lagoon has no entrance. Phosphatic rock of much value as a fertilizer is mined in quantities and exported to Australia and New Zealand. This gives the island its importance. Discovered in 1798, it was annexed by Germany in 1888 and occupied by an Australian force in 1914. It is now governed by

an administrator acting for Great Britain, Australia and New Zealand under a League of Nations mandate. Population 2677, including 164 Europeans. Phosphate exports amounted to 363,680 tons in 1933, and to 695,822 tons in 1934 (value, £97,684).

NAUSEA, *naw'shea*. A disagreeable sensation, usually referred to the stomach. The word is so strongly associated with sea-sickness that the terms are often used synonymously. The word is actually derived from the Greek *nausia*, "sea-sickness, or qualmishness," connected with the root *naus*, "a ship." In nausea the stomach muscle contracts gently in a direction that is the reverse of normal. Stronger contraction in this direction causes vomiting.

In addition to irritation of the stomach wall, revolting sights and painful, sudden blows are other exciting causes of nausea. The sensation is produced by the stimulation of certain nerves which have their centres in the medulla oblongata, and are connected with the stomach.

NAUTILUS, *naw'tilus*. A genus of deep-sea molluscs, containing only four living species. Formerly, however, the sea contained hundreds of species, the fossils of which show marked resemblances to those existing to-day. The best-known species is the *chambered*, or *pearly nautilus*. These names refer to the many-chambered shell in which the nautilus dwells, and to the inner lining of the shell, which is mother-of-pearl, or nacre.

The chambered nautilus lives upon the sea floor in the South Pacific and Indian Oceans, notably in the vicinity of the Philippines and the island of New Guinea. The shell of the young nautilus looks like a small horn, but as the animal develops, its home assumes the form of a spiral, and each stage of its growth is indicated by a chamber closed at the rear. That is, the nautilus moves forward as it grows, fashioning a partition behind it when it enters a new chamber; and in the outermost compartment will be found the living animal. Extending through the series of chambers, and connecting them with the body of the animal, is a coiled, fleshy tube, enclosed in a limy covering. This tube is called the *siphuncle*.

Though the nautilus is related to the octopus, it is not provided with the characteristic eight arms bearing suckers. Instead, there are about forty-five pairs of tentacles around its mouth, the pair on the inner side being joined to form a sort of hood that closes the opening into the shell when the animal draws back into the living chamber. These tentacles do not bear suckers, but their inner edges seem to possess the power of grasping objects by flattening against them.

It is supposed that by them the nautilus obtains its food—small crabs and molluscs. The animal has a short, thick body, a large head, eyes and balancing organs, four gills, and a heart. On the underside of its body, opening into the mantle cavity, is a siphon, or funnel, its organ of locomotion. Through this tube it sends a jet of water with enough force to push itself backward. For the *paper nautilus*, so called, see under ARGONAUT.

Scientific Names. The nautilus belongs to the class Cephalopoda—to which also belong the octopus and the squid—and family Nautilidae. The pearly nautilus is *Nautilus pompilius*. Another well-known species is *N. umbilicatus*.

NAVAL RESERVES. Every country having a navy maintains a naval reserve formed of officers and seamen whose terms of enrolment in the navy have expired, or who have been honourably discharged. In countries where military service is compulsory, the service is made up, for the most part, of men who have completed their training in active service with the fleet.

In the British Empire, the Royal Naval Reserve was formed in 1853 under the Board of Admiralty. It consists of officers and men of the Mercantile Marine, who train for short periods in His Majesty's ships and are available for service with the Royal Navy in time of war. Officers and men of the R.N.R. rendered invaluable service throughout the World War.

The R.N.R. must be distinguished from the Royal Fleet Reserve, which consists of naval ratings who have served their time afloat; this reserve consists of about 70,000 men.

Naval Volunteers. The R.N.V.R. was formed in 1902 of public-spirited civilians, who wished to fit themselves to serve with the Royal Navy in time of war.

It is formed in eight divisions: London, Sussex, Tyne, Mersey, Clyde, Severn, East Scottish and Ulster.

Members of the R.N.V.R. served largely in trawlers and light craft engaged in mine-sweeping and submarine hunting from 1914 to 1918.

NAVARINO, *nav a re' no*, BATTLE OF. See GREECE (Modern History).

NAVARRÉ, *na var'*, KINGDOM OF. Little is known of the early history of this state; it comprised both slopes of the Pyrenees, its population was mainly Basque. The name goes back to the seventh century. Its people fought for freedom against the Saracens, who called them the Christians of Al Frank, and against Charlemagne and his

successors. Its most powerful period began with Sancho Garcia early in the tenth century. Sancho *El Mayor*, or the Great, in



SHELLS OF THE CHAMBERED NAUTILUS

Photo: Visual Education Service

the next century won Castile for his son Fernando (d. 1065), who also conquered Leon and drove back the Moslem. Navarre passed to another son, Garcia, and remained independent. Its position brought it into intimate relations with France, the Spanish kingdoms and, in the fourteenth and fifteenth centuries, with England, which then controlled Aquitaine. Charles the Bad of Navarre, a contemporary of Edward III, constantly played off one against another. In 1516 the last of Spanish Navarre was seized by Ferdinand of Spain. The King of Navarre, Henry d'Albret, in 1527 married Margaret of Angoulême, sister to Francis I of France, the charming and learned lady who wrote the *Heptameron* and was a patroness of letters. Their daughter, Jeanne d'Albret, married Antoine of Bourbon, a descendant of Louis IX of France. He was a man of weak character who played a vacillating part in the wars of religion. Their son, Henry of Navarre, succeeded to his mother in 1572. His marriage with the brilliant and beautiful Margaret de Valois was the occasion of the Massacre of St. Bartholomew. On the death of his kinsman Henry III in 1589, he became Henry IV of France, and Navarre ceased to exist as an independent kingdom.

NAVE. The portion of a church that extends from the choir rails to the main entrance, usually occupied by the laity, the choir and transepts being reserved for the clergy. Architecturally, the nave of a church is the highest and central part of a church, from the floor to the roof, including the clerestory. When the centre portion of the church is flanked by aisles, only the centre is styled the nave.

NAVIGATION. Name given to the science which deals with the determining of the

position of a ship at sea, and directing its course from place to place. Such early seafaring men as the Phoenicians, the Carthaginians, and the Greeks felt their way from point to point along the coast and rarely ventured out of sight of land. The Vikings were bolder, making marauding expeditions to the British coasts and river towns, colonizing Iceland, and even discovering Canada. These early mariners used the stars as a guide at night.

Toward the close of the Middle Ages, however, navigation made great strides. In the thirteenth century, the mariner's compass came into general use. Prince Henry of Portugal (1394-1460) was very much interested in geography, and inspired by him, the Portuguese sailors began to venture into unknown seas. He established an observatory and school for instruction in the methods of navigation at Sagres, and may be considered the founder of the science of navigation. With the discovery of the astrolabe for determining longitude, and later, with the invention of a device for taking the height of the sun and stars, greater accuracy in holding a course was made possible. Trigonometry and logarithms began to be used in calculations by the seventeenth century.

The advance made in the science of wireless telegraphy in the nineteenth and twentieth centuries has been of very great assistance to navigators, especially as the accuracy in determining position by means of astronomy depends almost entirely upon accuracy of time. Over fifty wireless stations, situated in different countries, transmit time daily to the vessels at sea. A system of time zones has been developed, so that ships at sea can keep the same time as any designated places on land. The publication of special tables for finding the zenith distance has greatly simplified the use of position zones.

The principal instruments used in navigation are the *compass* (which sec), by the aid of which the ship is kept on the desired course; and the *sextant* and *chronometer*, with the aid of which the ship's geographical position can be determined. Wireless directional beams are also an aid.

NAVIGATION ACTS. The name given to a number of laws passed by the Parliament of England in 1645, and in later years, for the protection of British commerce. The first of the series, passed in 1645, forbade the importation into England of whale oil in vessels other than English, or ships which were not manned by English sailors. The Act known officially as the First Navigation Act was passed by Parliament in 1651 against the colonies and the Dutch, who were enjoying a great part of the carrying trade between the West Indies and Europe.

This Act provided that no products from any foreign country, except only those imported directly from their places of growth and manufacture in Europe, might be imported into England in any but English-built ships, navigated by English navigators, with at least three-fourths of the sailors Englishmen. The Act was not rigorously enforced, and the Dutch continued to trade with the colonies.

The chief object of the Navigation Acts was conceived to be not merely the creation of a trade monopoly (about the economic wisdom of which doubts arose) but the fostering of the British Merchant Service as a nursery for seamen upon which, in time of war, the navy might draw. The military strengths of the Empire was, therefore, thought to be involved in the enforcement of the Acts.

As a result, other Acts were passed in 1660, 1663, and 1672. The Act of 1660 required that all tobacco and other goods must be brought to England for re-export. The Act of 1663, usually referred to as the Second Navigation Act, declared that all goods, with few exceptions, imported into the colonies must be first landed in England. This meant that the colonies must import all their commodities from England. The colonies violated these laws until 1672, when another Act was passed. Later, duties were levied on goods shipped between colonies, if the same products could be obtained in England.

Before 1761, twenty-nine Acts had been passed in restraint of colonial trade.

The Navigation Acts were repealed in 1849.

NAVY. In its narrowest sense, and the one in which the term is generally used, the navy includes the warships and their auxiliaries, naval aircraft, and the necessary personnel of officers and men. In war fare the work of the navy may be more influential in bringing a war to a close than all the engagements of the hostile armies together.

The primary object of the navy is to ensure that one's ships may continue to use the seas in war as in peace, and to deny the use of the seas to the ships of the enemy. To attain this end one's fleet must seek out and destroy the enemy's navy, or at least immobilize it. Thus Nelson's overwhelming victory at Trafalgar put an end to all Napoleon's overseas projects, secured England from invasion, enabled her to carry timely aid to her continental allies, and brought many other benefits in its train. Again, although during the World War the Grand Fleet never succeeded in destroying the German fleet, it confined it within a comparatively restricted area of the North Sea. In this way it secured command of the surface of the sea for the Allies, whose shipping

was thereby virtually relieved of all fear of attack by surface ships. It also facilitated enormously the work of the host of small vessels engaged in anti-submarine operations, as it enabled them to carry on their work without danger of interference from superior forces.

Another duty of the navy in war is to blockade the ports of the enemy and prevent him from trading with other nations. In the

portion of these ships can be prevented from reaching their destination it follows that the people must starve and the industries perish. No other country is so vitally dependent on seaborne supplies as is Britain. In these circumstances lie the reason for Britain's supreme need for a strong navy.

Warships. A modern navy is made up of a multiplicity of types of ship, classified



PART OF THE FLEET IN THE HARBOUR AT GIBRALTAR

Photo: Topical

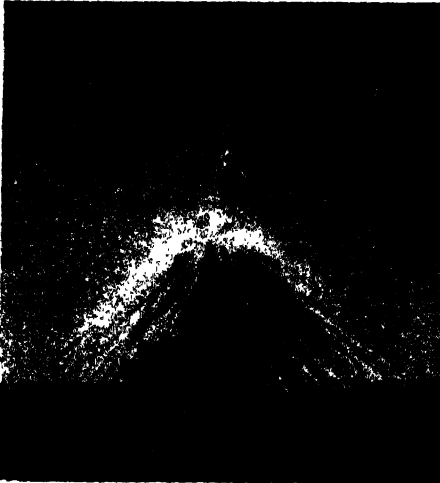
World War, the navies of the Allies practically gave them control of the oceans, and they were able to blockade the ports of the Central (Germanic) Powers to such an extent as to prevent these Powers from securing much-needed supplies. A blockade is naturally unpopular with neutral shipping, since a nation exercising the "right of search" causes delay to the transportation of goods and offends the dignity of the neutral. At the same time it is an immensely potent weapon, although it may be unspectacular in its action. Thus the British blockade is recognized as one of the most important causes—it has even been asserted that it was the main cause—of the German collapse in 1918, and its effects were still felt in Germany long after the conclusion of peace.

About 50,000 tons of foodstuffs and 110,000 tons of merchandise arrive daily in Great Britain in ships. If even a substantial pro-

portion of these ships can be prevented from reaching their destination it follows that the people must starve and the industries perish. No other country is so vitally dependent on seaborne supplies as is Britain. In these circumstances lie the reason for Britain's supreme need for a strong navy.

according to design and function as battleships, battle-cruisers, cruisers, aircraft-carriers, monitors, flotilla-leaders, destroyers, torpedo-boats, submarines, minelayers, sloops, minesweepers, net-layers, gunboats, depot ships, and fleet auxiliaries. Aircraft for work with the fleet also present a variety of types of which the principal are spotter-reconnaissance machines, torpedo-bombers, fighters, and seaplanes. The battleships furnish the main fighting strength of the fleet. To this end they are designed to combine the maximum of offensive power with the most effective possible protection. As these considerations have the prior claim on the disposable weight, engine power and speed are necessarily moderate by comparison with other vessels such as aircraft-carriers and cruisers. The characteristics of the battleship are by no means static, but are determined by the prevailing tactical and

strategical ideas as well as developments in weapons. Thus in battleships of the latest design, while a heavy gun armament and very complete protection against gunfire remain predominant features, more and more attention is being paid to protection against damage from torpedo or mine, and to the provision of a powerful anti-aircraft armament, backed by strong protection against aerial bombs. (See **BATTLESHIP**.) The battle-cruiser is a type which now is only to



THE NEW ARM

Bombing trials carried out against an obsolete American battleship.

Photo Photopress

be found in the British and Turkish navies, although Japan has three ships which were originally constructed as such, and Germany possessed a number during the war. While the battle-fleet is cruising, the battle-cruisers are usually stationed ahead in support of the "screen" of cruisers which is thrown out yet farther ahead. Their function is to support their own cruisers in their endeavours to find and report the movements of the enemy fleet, and at the same time to prevent the enemy cruisers obtaining the like information for their own fleet. As the action develops, they may be used either against the enemy battle-cruisers or, by virtue of their superior speed, to bring a concentration of fire against some selected part of the opposing battle-fleet. (See under **CRUISER**.) The cruisers with the battle-fleet, while cruising, act as scouts. When battle is joined, they may be used to support attacks on the enemy battle-fleet which are being delivered by their own destroyers, to repel attacks by enemy destroyers or cruisers, and, if opportunity, offers to employ their own

torpedo armament against the opposing battleships. Cruisers also have a most important function to perform in the protection of maritime commerce, and in the destruction of enemy seaborne trade. For Britain, an adequate cruiser force is a paramount consideration, on account of her utter dependence on sea communications. For example, although at the beginning of the World War she had 100 cruisers, they barely sufficed for her needs. (See **CRUISER**.) Aircraft-carriers act as mobile aerodromes, accompanying the battle-fleet. Their aircraft, together with the aircraft from the ships which are fitted with catapults, are used for reconnaissance work in collaboration with the scouting cruisers, for attacking enemy ships with bombs and torpedoes, to assist the control of gunfire by "spotting" the fall of shot, and to destroy hostile aircraft. In future wars, carriers may also fulfil an important function in the protection of trade routes. (See **AIRCRAFT-CARRIER**.) While the fleet is cruising, the destroyers are stationed round the heavier ships to act as a protective screen against submarine attack. In action, their function is to attack the enemy battle-fleet with torpedoes, both by day and by night, and to repel similar attacks by the enemy destroyers. They may also be used to lay smoke screens to conceal the movements of other ships, such, for instance, as a turn made to withdraw from an unfavourable tactical position. In the World War, destroyers were extensively used to convoy merchant ships and to hunt down enemy submarines; and also to lay mines in the Heligoland Bight. (See **DESTROYER**.) Monitors do not work with the fleet, but are employed against harbour works and coastal fortifications. (See **MONITOR**.) Submarines of special types may operate with the fleet. The normal type, however, is intended to act independently, attacking enemy ships and also serving as scouts in enemy waters where surface cruisers could not act without strong support. Submarine minelayers are employed to lay minefields close to the enemy's coasts where a surface minelayer could not venture. (See **SUBMARINE**.) Surface minelayers usually work independently of the fleet and are used for laying minefields for defensive purposes off their own coasts, or in more open waters where the risk of being surprised by the enemy while at work is comparatively small. (See under **MINEL**.) Minesweepers do not as a rule accompany the fleet to sea. Their function is to clear, and keep clear, safe channels through waters which are likely to be mined by the enemy, and particularly the approaches to the great ports and naval bases. Sloops for the most part are equipped so as to serve as

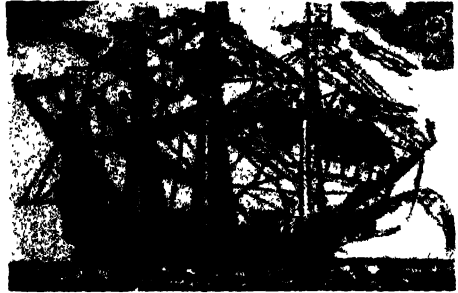
mine-sweepers in time of war: in peace they are employed on a variety of duties. Two new classes of sloop have recently made their appearance. The larger is intended for convoy duties on the high seas, the smaller for anti-submarine work in coastal waters. In order to keep a fleet in fighting trim, the services of a large number of auxiliaries are required. Depot ships serve as mobile bases for destroyers and submarines, while repair ships are equipped with engineering plant of all kinds, so that they are able to carry out on the spot repairs which would otherwise necessitate the services of a dockyard. Oil-tankers and supply-ships are also needed in large numbers.

The British Navy. The rise of British sea-power and the growth of the Royal Navy was no sudden happening, but a slow and hard-won evolution of centuries—often in face of apathy and ignorance on the part of the British Government. Parsimony and neglect to maintain, supply, and victual ships, handicapped our finest seamen; even Nelson when watching Toulon complained sadly of the condition of his ships; yet great victories were won in spite of rotten gear and bad powder.

Naval History. Since the time when a Roman admiral, "Count of the Saxon Shore," guarded the coasts of Britain, a fleet has been essential to these islands. Close intercourse with Norman France necessitated protection against Viking raids, and later, Edward I and III needed large numbers of ships for their wars in France, and gave special privileges to certain ports. It was not, however, until Henry VIII came to the English throne that a powerful navy

Winchelsea—furnished large numbers of armed merchantmen to increase the fleet.

Tudors and Stuarts. Though under Elizabeth the Navy suffered from the Queen's parsimony, her reign nevertheless marked one of the greatest periods of England's maritime history. Under leaders such as Drake and Hawkins, Frobisher, Raleigh and Grenville, her island kingdom was carried to the very forefront of maritime Powers. The attempts of her seamen to trade with the Spanish colonies roused the ire of their Sover-



HENRI GRACE À DIEU

Built 1512-14, it was the largest ship in the Navy of Henry VIII.

Photo: British Museum

eign who wished to keep the New World as a close preserve. Philip II prepared a mighty fleet to crush for ever heretic England; but when the Great Armada entered the Channel it was unmercifully handled by the English fleet under Howard of Effingham and Drake. The hazards of the sea completed the work so well begun, and only a sorry remnant of the Armada made Spain again.

Under the pacific James I, the navy was allowed to sink to its lowest ebb of impotence. Charles I essayed to mend matters, but with only moderate success; and his attempt to levy "Ship Money" for the purpose brought him into conflict with his parliament and was a contributory cause of the Civil War. When that unhappy struggle broke out, the fleet first supported the Parliament, but later a large part of it went over to the King and, under Prince Rupert, caused the Commonwealth considerable disquiet. Cromwell, by his Navigation Act and other measures, set himself to forward Britain's maritime interests. In so doing he excited the jealousy of the Dutch, who in the interim had become the leading maritime Power, and who now saw their predominance threatened. A quarrel became inevitable. In the *First Dutch War* (1652-4) the English were led by Blake and Monck, the Dutch by Tromp. After some vicissitudes, the English found the tide of fortune setting in



ARK ROYAL OR ARK RALEIGH

Largest ship in Queen Elizabeth's Navy (800 tons).

Photo: British Museum

was formed and sea laws laid down for its guidance.

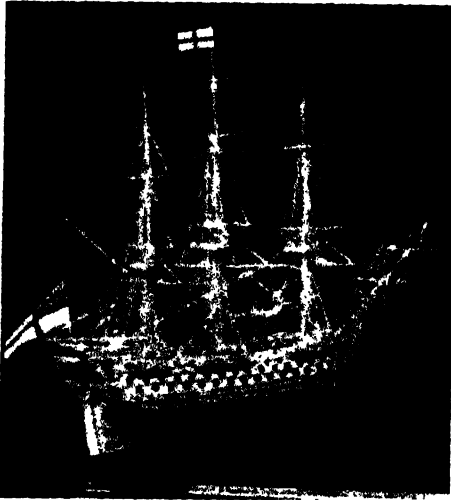
Throughout the Middle Ages, the number of "King's Ships" was small, and the "Cinque Ports"—Dover, Hastings, Hythe, Romney and Sandwich, with later, Rye and

their favour, and Monck's overwhelming victory off Scheveningen, when Tromp fell, enabled them to conclude a favourable peace. Charles II continued the naval policy of his predecessors, and this led to a further conflict with the Dutch. In the *Second Dutch War* (1664-7) the English commanders were James, Duke of York, Monck, and Prince Rupert; while de Ruyter had taken the place of Tromp. At first things went well for

placing him securely on his throne. (*War of the English Succession, 1689-97.*) At the Battle of Beachy Head, Torrington, with an Anglo-Dutch fleet, suffered a reverse at the hands of the French for which he was most unjustly disgraced by William; but Russell redressed the balance by his victory at Barfleure, and Rooke set the crown on his work at La Hogue.

The seventeenth century saw many important innovations brought into the administration of the fleet, not a few of which were attributable to Samuel Pepys, when "Clerk of the Acts" at the Navy Office. In 1652 the "Articles of War," by which the fleet is governed, were first formulated; and in 1653 the "Fighting Instructions," the first tactical manual provided for the navy, were brought out. Measures were taken to ensure a supply of competent officers. The old scheme of converting merchantmen to serve as warships when need arose was seen to be no longer practicable, and thenceforth the majority of men-of-war were built specially for their task. These fighting ships were classified in *rates*, and a regular system of organizing fleets into *Red, White, and Blue Squadrons* was inaugurated.

Eighteenth-century Wars. In the *War of the Spanish Succession* (1702-13) England took up the cause of Austria. In 1702 Rooke captured a Spanish treasure fleet under French convoy in Vigo Bay. Two years later he took and held Gibraltar, and defeated off Malaga a Franco-Spanish fleet which was moving to its recapture. His conduct was misrepresented in England, and he was rewarded with dismissal. Leake, besides twice relieving Gibraltar, defeated a French fleet off Marbella, and later, with military assistance, captured Alicante, Majorca, Sardinia, and Minorca. Shovell similarly took Barcelona. Although, by the terms of peace, the French candidate was placed on the Spanish throne, England secured important overseas possessions and other benefits. During the years of peace which followed, the navy was neglected, so that when the *War of the Austrian Succession* (1740-8) broke out it was at a disadvantage. In this struggle, England supported the cause of the luckless Maria Theresa of Austria. The first big action, off Toulon, ended unsatisfactorily, but in 1747 Anson, not long returned from his voyage round the world, utterly defeated a French fleet in the First Battle of Finisterre. In the same year, at the Second Battle of Finisterre, Hawke achieved a victory almost comparable. Two years previously Admiral Warren had captured Louisbourg. The Peace of Aix-la-Chapelle (1748) brought England little advantage, although it left her in a favourable



MODEL OF H.M.S. DREADNOUGHT
One of the last of the sailing ships of the line
Photo: Topical

England; although when, in a misguided moment, she divided her forces, she narrowly escaped disaster in the Four Days Battle. The situation was saved by Monck's superb handling of his fleet, which excited the open admiration of de Ruyter. At the Battle of St. James' Day, which was fought not long after, Monck inflicted a defeat on the Dutch which came near to being decisive. Unhappily, for lack of funds, Charles had to lay up his fleet prematurely. De Ruyter thereupon forced his way up the Medway and inflicted considerable damage on the shipping there. In spite of this reverse, Charles was able to conclude a peace which was not wholly unfavourable. England entered the *Third Dutch War* (1672-4) as an ally—and virtual mercenary—of France. But the French proved anything but satisfactory collaborators, so that on more than one occasion James, Duke of York, and Prince Rupert, once again in command, were hard put to it to avoid defeat. Eventually England withdrew from an unprofitable contest. In the Revolution of 1688 the navy declared for William III, and was largely instrumental in

position at sea. The respite was not long, though long enough yet again to enable neglect to impair the efficiency of the navy. When, therefore, the *Seven Years War* (1756-63), which was born of the rivalry between England and France in North America, broke out, once more she entered the struggle at a disadvantage. Admiral Byng was sent to the Mediterranean, where the French were besieging the British garrison in Minorca. Although in the Battle of Minorca he had the advantage, he failed to save the fortress, for which he was afterward tried and shot. Meanwhile, in India, Admiral Watson was co-operating successfully with Clive to drive the French out of the peninsula. In 1758 Admiral Boscawen captured Louisbourg for the second time—it had been returned to France in 1748; and in the following year General Wolfe and Admiral Saunders, in one of the most admirable partnerships between land and sea officers ever recorded, won Quebec, and with it the dominion of Canada. This same year (1759) also witnessed two notable victories at sea, Boscawen's defeat of a French squadron off Lagos, and Hawke's annihilation of another force which he pursued into Quiberon Bay in spite of rocks, gathering darkness and a rising gale. In 1761 Commodore Keppel captured Belle-Ile, and two years later peace was concluded. Although in the settlement England returned much to her enemies, she retained Canada and recovered Minorca in exchange for Belle-Ile.

When the *War of American Independence* (1775-83) broke out, France, Spain and Holland saw a profitable occasion in George III's quarrel with his American subjects, and espoused the rebel cause.

The negligence of Lord Sandwich had allowed the Navy to deteriorate, and the nation had to pay a heavy price for his mismanagement. To quote from *Historical MSS.*, 1779, "A fleet to equip without stores, to victual without provisions, and to man without men . . . the gunpowder in particular so bad that the balls dropped short."

At this period the French fleet was a more efficient fighting machine than it had ever been before, or was to be afterward. In gunnery, it had long adopted the principle of firing so as to cripple its adversary's rigging and sails, while the British, bent on destroying their opponents, aimed at the hull. The result was that when, in 1778, Keppel brought the Comte d'Orvilliers to action off Ushant, his ships were so crippled aloft that, in spite of inflicting greater material damage on his enemies, he could not pursue, and the French were able to withdraw. Byron suffered a like experience off Granada in the next year. In 1780, however, Rodney

achieved a notable victory over a Spanish fleet in the Moonlight Battle (First Battle of St. Vincent), and followed it up with a success against the French off Martinique. This same year saw the Armed Neutrality of the North (Russia, Prussia, Denmark and Sweden) formed to set a limit to the manner in which Britain might make use of her sea power. Gibraltar was besieged and twice relieved, first by Rodney and then by Admiral Darby. On the other hand, in 1782 Minorca was again lost.

In 1781, Admiral Kempenfelt destroyed twenty French transports in sight of a much superior French fleet under de Guichen, but his fleet was too weak to prevent the dispatch of a French army under the Comte de Rochambeau from Brest to America. This expedition, coupled with the failure of Admiral Graves to defeat a numerically stronger French fleet under the Comte de Grasse off Chesapeake, led to the surrender of the British Army commanded by Cornwallis. 1782 opened with a clever stroke by Hood at St. Kitts, by which he completely outwitted the greatly superior fleet of de Grasse, and led to Rodney's victory off Dominica, the Battle of the Saints, which saved the West Indies and restored command of the sea to Britain. In this same year Gibraltar was again relieved, by Admiral Howe, who thereafter heavily defeated a Franco-Spanish fleet off Cape Spartel. In the Treaty of Versailles, which brought the war to a close, England recognized the independence of her revolted colonies and, in spite of her favourable position at sea, relinquished to France and Spain St. Lucia and Tobago, Minorca and Florida.

A brief ten years only were to elapse before England was again to find herself embroiled with France, in the *War of the French Revolution* (1792-1802). The monarchies of Europe banded together in the First Coalition to combat the menace represented by French republican fervour. In the same year Admiral Lord Hood took Toulon, and in the following year Corsica; but neither could be held, and the Mediterranean itself was evacuated for a time. Just previously, however, Lord Howe had won his celebrated victory of the Glorious First of June, over de Villaret-Joyeuse. In 1796 Admiral Lord Keith took the Cape of Good Hope. Meanwhile, on land, France was breaking up the First Coalition, bringing Holland under her own dominance and acquiring Spain as an ally. Thus three of the most powerful navies in the world were united against Britain. The gloomy prospect was lightened when, early in 1797, Jervis, with Commodore Nelson as his second-in-command, defeated a superior Spanish fleet off Cape St. Vincent.

But the outlook darkened again when, a month later, the fleet at Spithead mutinied; and shortly afterwards the fleet at the Nore followed its example. The seamen were given redress for their very genuine grievances, and late in the year Duncan inflicted a crushing defeat on the Dutch fleet at Camperdown. Two years later the remnant of the Dutch navy was surrendered. In 1798 Jervis (now Lord St. Vincent) learnt that the French were fitting out an overseas expedition in Toulon, and he dispatched Rear Admiral Nelson to deal with it. Nelson was unable to prevent Napoleon landing his army in Egypt, but at the Battle of the Nile he destroyed his escorting squadron and so cut him off from France. The same year the Second Coalition against France was formed. The year 1800 was marked by the surrender of Malta to an English force and by the Tsar's revival, at Napoleon's instigation, of the Armed Neutrality of the North. Hyde Parker, with Nelson as his second, was sent into the Baltic to deal with it. Denmark proved obstinate, and at the Battle of Copenhagen (1801) Nelson destroyed her fleet. Shortly afterwards the Tsar was murdered, and the confederacy broke up. A situation had now been reached in which Britain was dominant at sea, France on land. Both sides were war-weary and in 1802 the Peace of Amiens was concluded.

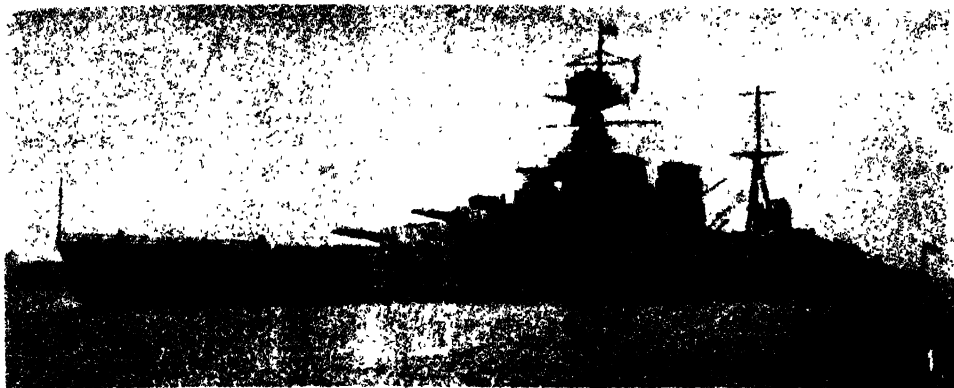
Napoleon Checkmated. But Napoleon's conduct made the continuance of peace impossible, and in 1803 Britain declared war. Admiral Cornwallis was to blockade Brest, and Nelson, Toulon. In 1805 the Third Coalition against France was formed. Napoleon had evolved a plan for the invasion of England which envisaged the concentration of the Franco-Spanish fleet in the West Indies before returning in overwhelming force to dominate the Channel. Admiral Villeneuve succeeded in getting to sea and picking up a Spanish detachment. Nelson pursued him across the Atlantic and back again until he took refuge in Vigo. On his way in he was engaged by Calder's squadron and lost two ships. Later he contrived to move south to Cadiz. At Napoleon's behest he put to sea. Nelson was awaiting opportunity; and off Cape Trafalgar, on 21st October, 1805, he won the greatest sea victory of all time. From that day Britain's command of the sea was assured, and all Napoleon's overseas ambitions frustrated. Only a small body of French ships escaped the holocaust, and these were later taken by Captain Strachan's division off Cape Ortegal.

In 1806 Duckworth defeated a French squadron off St. Domingo. The same year Napoleon inaugurated his "Continental System," designed to destroy British trade.

Britain countered with a series of Orders in Council. Meanwhile the Third Coalition was breaking up, and Russia allied herself with France. In 1807 Duckworth forced the Dardanelles, and the Danish fleet was surrendered after the bombardment of Copenhagen. Britain was now beginning to feel the effects of the Continental System severely, and, to add to her misfortunes, in 1812 the United States, exasperated by the blockade, declared war on her. The U.S.A. possessed no ships of the line but their powerful frigates took several British ships. In 1813, however, the *Shannon* redressed the balance in her celebrated duel with the *Chesapeake*, and the next year peace was concluded. Meanwhile Napoleon's star was setting. Waterloo finally destroyed his hopes, and shortly afterward he surrendered to Captain Maitland of the *Bellerophon*.

Although the eighteenth century was a period of almost continuous warfare, it is notable also for Anson's voyage of circumnavigation of the globe, and Captain Cook's discoveries. It also saw the introduction of the Signal Book—Kempenfelt's handiwork—in 1782; while further improvements were effected in the system of training officers and in 1748 uniform for officers was adopted.

Nineteenth Century. The end of the Napoleonic wars left the British navy supreme and without rival with the usual consequence that it fell into neglect; nevertheless, this was for it a period of supreme importance. The only considerable war from the maritime point of view was the *Crimean* (1854-6). Squadrons were sent into the Baltic and Black Seas, but little opposition was experienced from the Russian fleet. The Black Sea squadron was largely concerned in the siege of Sevastopol, bombarding it from the sea and also landing guns and men to reinforce the siege batteries. The navy participated, however, in numerous other campaigns, fighting for the most part on land and in support of the army. Among these were the *First and Second Chinese Wars* (1839-42 and 1856-60), the *Abysinian Expedition* (1867), the *Ashanti War* (1874) and the *First South African War* (1880). In the *Indian Mutiny* a naval brigade participated in the relief of Lucknow. In 1882 Alexandria was bombarded, and detachments from the ships participated in the subsequent *Egyptian War* and the campaign against the Mahdi in the Sudan which followed it. In the *Second South African War* naval guns played an important part at the defence of Ladysmith, and naval brigades fought in several of the more important battles. In China also, during the *Boxer rebellion*, the navy played an important part in the relief of the Legations



1. H.M.S. *Hood*, Battle-cruiser. Displacement: 42,100 tons; Speed: 31 knots; Guns: 8-15 in., 12-5.5 in., 4-4 in. anti-aircraft; Torpedo tubes: 6-21 in.
2. H.M.S. *London*, Cruiser. Displacement: 9750 tons; Speed: 32.25 knots; Guns: 8-8 in., 4-4 in. anti-aircraft; Torpedo tubes: 8-21 in.
3. H.M.S. *Courageous*, Aircraft-carrier. Displacement: 22,500 tons; Speed: 30.5 knots; Guns: 16-4.7 in. anti-aircraft.
4. H.M.S. *Nelson*, Battleship. Displacement: 33,500 tons; Speed: 23 knots; Guns: 9-16 in., 12-6 in., 6-4.7 in. anti-aircraft; Torpedo tubes: 2.

Photos: *Gianni*

in Pekin. Piracy was a constant preoccupation of the naval commanders in all parts of the globe. In 1819 Lord Exmouth bombarded Algiers, destroyed the Dey's piratical fleet, and liberated many thousands of Christian slaves. In the China seas, trouble from this cause was endemic, and continues so until the present day. Unremitting war was waged against the slave trade also, with remarkable success but at the cost of many lives.

The fleet also performed many other services in the cause of humanity. Under the Hydrographic Department, constant surveys were carried out all over the world; and the renowned Admiralty charts were being produced for the benefit of mariners of all nations. Ships were constantly being sent to aid communities or other ships in distress; in particular, the Mediterranean fleet gave timely aid in the Messina earthquake disaster of 1908.

The century also witnessed revolutionary changes in material. Trafalgar was fought with wooden ships propelled by sails, and armed with primitive muzzle-loading guns. By 1900 sail had wholly disappeared except in a few subsidiary vessels; steel had displaced wood as the material for ship construction and armour plate had reached a high degree of development; breech-loading rifled guns, the largest on elaborate power-operated mountings and throwing a shell weighing 850 lb. or more, took the place of the clumsy hand-worked truck guns. The mine had been developed, and later the locomotive torpedo brought in its train new methods of construction, new ship types and new tactics. The opening years of the twentieth century saw the introduction of the submarine, wireless telegraphy, oil fuel in place of coal, and aircraft as an essential instrument of naval warfare.

In the all-important sphere of personnel, changes were wrought which, if less striking, were still of the first importance. The system of training officers was constantly being developed, and the Engineer branch was introduced to take charge of the new machinery. In 1853 a continuous service system was introduced to replace the old haphazard method of signing on (or, at worst, impressing) seamen as and when required, and four years later uniform for the seamen was introduced. Technical developments necessitated the provision of new classes of specialist ratings, and the need for reserves of men resulted in the formation of the Royal Fleet Reserve, the Royal Naval Reserve and the Royal Naval Volunteer Reserve. See NAVAL RESERVES.

As the nineteenth century progressed Russia, and once more France, came to be

regarded as Britain's maritime rivals. In the 1880's it became apparent that once again the fleet had been permitted to fall below the security level. The Naval Defence Act ensued, by which the navy was brought up to the "Two Power Standard" which was accepted as the minimum for national safety. The outcome of the Franco-German War, however, brought a new and far more dangerous rival into the field. The German Navy Acts of 1898 and 1900 committed that country to a programme of naval expansion which compelled Britain to follow suit. The *entente* with France and Russia, and the concentration of the main British strength in home waters, followed, while France took over a greater share of responsibility for the Mediterranean. Attempts to stay the race in armaments between Britain and Germany proved of little avail, and in 1914 war broke out.

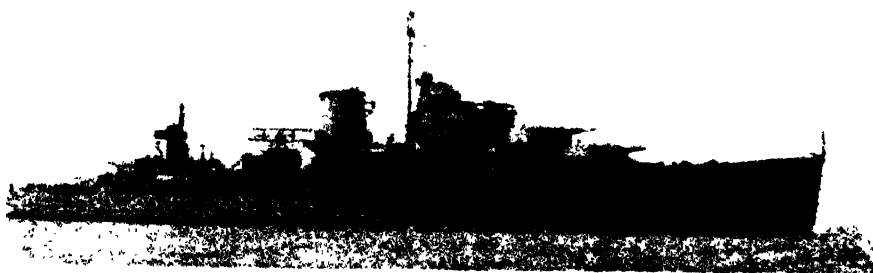
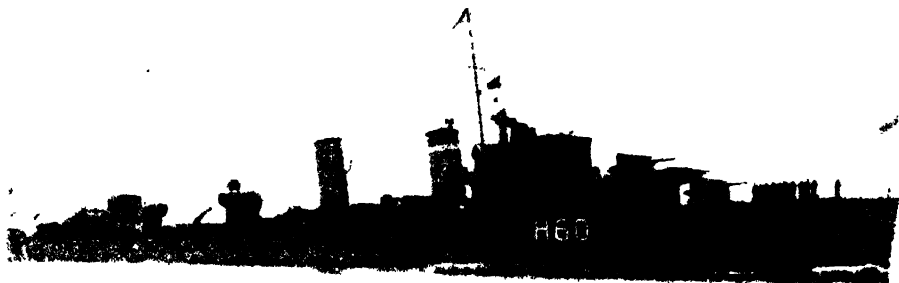
(For the part played by the navy in the Great War, see under WORLD WAR.)

Post-war Developments. The conclusion of the Peace of Versailles, 1919, left Britain once more supreme at sea; but this time with two potential rivals, the United States and Japan. The experience of the war had opened the eyes of America to the importance of sea power, and she and Japan were regarding each other with growing distrust. An armaments race, in which Britain would have been compelled to join, was already beginning, when a conference was arranged to meet at Washington. Britain, the United States, Japan, France and Italy were all represented. The treaty which resulted provided for the immediate reduction of the fleets of all five Powers. The size of capital ships was limited to 35,000 tons with guns not exceeding 16 in. in calibre, aircraft-carriers to 27,000 with guns not larger than 8-in.; and ships of these two types might not be replaced until they were twenty years old. Any other warships constructed were not to exceed 10,000 tons with 8-in. guns. In the first two categories, the aggregate tonnage for each of the signatories was not to exceed--

	Capital Ships	Aircraft-carriers
British Empire	525,000	135,000
U.S.A.	525,000	135,000
Japan	315,000	81,000
France	175,000	60,000
Italy	175,000	60,000

As between the first three Powers, this introduced the "5 : 5 : 3" ratio which was to give rise to future disagreements.

With certain exceptions, Britain, America and Japan were to observe a *status quo*



From top to bottom: H.M.S. *Pandora*, Submarine. Displacement: 1475 tons on surface, 2040 tons submerged; Speed: 17.5 knots on surface, 9 knots submerged; Torpedo tubes: 8-21 in.; Guns: 1-4 in.
H.M.S. *Crusader*, Destroyer. Displacement: 1375 tons; Speed: 35.5 knots; Torpedo tubes: 8-21 in.; Guns: 4-4.7 in.
H.M.S. *Leander*, Cruiser. Displacement: 7140 tons; Speed: 32.5 knots; Guns: 8-6 in., 4-4 in. anti-aircraft; Torpedo tubes: 8-21 in.
H.M.S. *Halcyon*, Minesweeping Sloop. Displacement: 815 tons; Speed: 16.5 knots; Guns: 1-4 in., 1.4 in. anti-aircraft.

with regard to naval works in their Pacific possessions. Rules were framed regarding the conduct of war against merchant shipping, with particular reference to submarines, and also prohibiting the employment of poison gas. The signatories adhered to their rules, and invited all other Powers to do so. Britain endeavoured, without success, to secure the abolition of submarines. The Treaty was to remain in force at least until the end of 1936; those clauses dealing with war against merchant shipping and the use of gas were to remain operative in perpetuity. By her adherence to this treaty Britain voluntarily surrendered the supremacy at sea which had been hers since Trafalgar.

In 1930 a new Conference was held in London, at which the same five Powers were represented. This resulted in a further reduction of capital ship strength on the part of the three strongest powers, and a postponement of the laying down of replacement tonnage. Cruisers and destroyers were defined, the former being subjected to the existing limit of 10,000 tons and 8-in. guns for ships other than capital ships, while destroyers were limited to 1850 tons and 5.1-in. guns (but not more than 16 per cent of the permitted total tonnage were to exceed 1500 tons). Cruisers were further divided into two sub-categories, i.e. those armed with guns above 6.1-in. and those with guns not above 6.1-in. Submarines were limited to 2000 tons and guns not above 5.1-in. Rules were also formulated regarding the less important types of warship. The ages at which cruisers, destroyers and submarines might be replaced were fixed at 20, 16 and 13 years respectively, except that cruisers and destroyers laid down prior to certain dates became "over age" at 16 and 12 years

respectively. Britain, the U.S.A. and Japan further agreed that their aggregate tonnage in certain classes should not exceed the figures given below—

	British Empire	U.S.A.	Japan
Cruisers—			
(a) With guns above 6.1-in. calibre	146,800	180,000	108,400
(b) With guns of 6.1-in. calibre or less	192,200	143,500	100,450
Destroyers	150,000	150,000	105,500
Submarines	52,700	52,700	52,700

The maximum number of cruisers in class (a) permitted to the three Powers was agreed at eighteen, fifteen and twelve respectively. Under this arrangement Britain was enabled to have a slight superiority in the less heavily gunned class of cruiser as compared with the United States. No limits were imposed on the tonnages of cruisers, destroyers and submarines to be possessed by France and Italy, neither did these two Powers accept the limitations of size and armament placed upon destroyers. France has taken advantage of this freedom to construct a large number of powerful "flotilla-leaders" which heavily outclass anything possessed by Britain, America or Japan. The main part of the treaty was to remain in force until 31st December, 1936, but certain clauses were to stand without time limit. As in the case of the Washington Treaty, a clause was included which enabled any of the Powers affected to increase their tonnage beyond the agreed limits should they consider that, as a result of altered circumstances, their security was jeopardized. As at Washington,

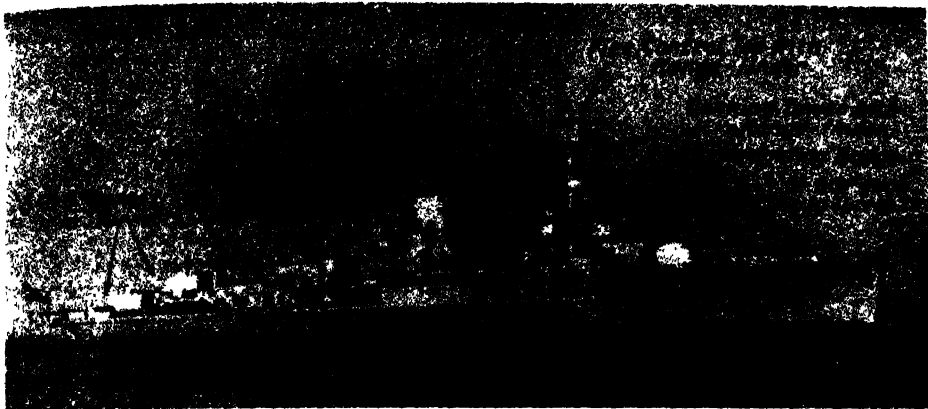


FRENCH FLOTILLA-LEADER "LEOPARD"

Displacement: 2126 tons; Speed: 35.5 knots; Guns: 5-5.1 in., 2-3 in. anti-aircraft; Torpedo tubes 6-21.7 in.

(NOTE. By reason of her non-adherence to the London Naval Treaty, 1930, France was enabled to build these and succeeding classes of "leaders" in excess of the displacement limits accepted by the British Empire, United States and Japan.)

Photo: Wright & Co.



GERMAN CRUISER "LEIPZIG"

Displacement: 6000 tons; Speed: 32 knots; Guns: 9-5.9 in., 6-3.4 in. anti-aircraft; Torpedo tubes: 12-19.7 in.

(NOTE: Since this photograph was taken, a catapult for launching seaplanes has been fitted between the funnel and the mast.)

Photo: Gierres

also, Britain tried to secure the abolition of submarines; but again she was unsuccessful.

In 1934 Japan gave notice to terminate the Washington Treaty, and a Conference was summoned to meet in London in 1935. The British Empire, the U.S.A., France, Italy and Japan were once again represented. Unhappily Japan demanded the abolition of the "5 : 5 : 3" ratio, suggesting in its place a "common upper limit" which should apply equally to Britain, America and herself. When it became apparent that her demand was not going to be conceded she withdrew her delegation. Her action virtually wrecked the Conference and Italy also withdrew later, although Britain, America and France agreed upon a treaty which, *inter alia*, fixed the maximum gun calibre for capital ships at 14 in., limited aircraft-carriers to 23,000 tons and guns not exceeding 6.1 in., and made provision for the advance notification and exchange of information regarding ship-building programmes. But with two of the five greater naval Powers not a party to it, it would be unwise to found too sanguine hopes upon this agreement.

While these conferences were being held, the German Navy was once more becoming a factor to be reckoned with. The Treaty of Versailles had placed strait limits on the number and types of ships Germany might possess, and submarines and aircraft were forbidden her altogether. Moreover, battleships were limited to 10,000 tons displacement, her cruisers to 6000 tons with guns not exceeding 6-in. calibre, and her destroyers to 800 tons. Very soon her con-

structors were showing that, by careful attention to weight-saving, and by the use of high-grade materials, they could produce cruisers and destroyers which possessed notable fighting qualities for their size. But their most remarkable achievement is the so-called "pocket battleship," the first of which (*Deutschland*) passed into service in 1934. These ships are so fast that no existing capital ship (other than the three British battle-cruisers and, possibly, three ships possessed by Japan) can catch them, and so powerful that no cruiser can stand up to them. They thus present a tactical and strategical problem of some consequence; and as a first step towards the solution of this problem France has under construction two specially fast battleships. In 1935 Germany administered a further shock, by declaring that she would no longer hold herself bound by the limits imposed at Versailles. She had already gone a long way towards implementing her intention by beginning the construction of submarines as well as of two 26,000 ton battleships. A conference between Britain and Germany was accordingly arranged. As a result, Germany undertook to limit her fleet, on a tonnage basis, to 35 per cent of the aggregate tonnage of the British navy. An important exception was made with regard to submarines. While not exceeding the ratio of 35 : 100 in respect of total tonnage, she might possess a submarine tonnage equal to the submarine tonnage of the British fleet. She undertook, however, except under certain circumstances, to limit her submarine tonnage to 45 per cent of that of the British. In 1936 in view

of the building programmes of other Powers, Britain invoked the escalator clause of the Washington Treaty as regards destroyers.

History of Warships. The earliest warships were products of the nations which bordered on the Mediterranean. The Egyptians had their war galleys, which were large rowing boats with a sail to assist the oarsmen in a favouring wind. The Greeks and the Romans also used galleys, but their vessels were constructed on a more elaborate scale. They were bigger, and were propelled by a large number of oars arranged in tiers one above the other. The rowers, who were generally prisoners of war or slaves, sat on benches or "banks," and two or more men were assigned to each oar. One, two or even three masts were fitted. The largest galleys had three banks of oars and from this fact were termed *triremes*. The principal weapon of the galleys was a formidable beak or "ram," made of wood iron-tipped, with which they endeavoured to smash through their opponents' timbers. Secondary weapons were bows and arrows, javelins and darts, stones and other missiles thrown from catapults, and Greek fire, a composition which, once ignited, was extremely hard to extinguish. Tactics were for the most part devoted to the successful employment of the ram; failing the destruction of the opponent by this means the opposing galleys were laid alongside each other and hand-to-hand fighting ensued. The medieval galleys followed much on the lines of their predecessors, except that, in due time, they were armed with guns. The plan on which the galleys were built made it difficult to mount more than a very few guns satisfactorily, and these were concentrated on a platform erected in the bows. Galleys reached their zenith in the sixteenth century, and their last great fight was at Lepanto (1571), when Don John of Austria and Andrea Doria engaged the Turkish fleet.

The galleys did their work well enough in the comparatively sheltered waters of the Mediterranean, and round the coasts of Spain, but they were little suited to the more turbulent seas of northern Europe. True, the Norsemen used oars as well as sail to propel their "long ships," but these craft were much more seaworthy than the galleys, and accomplished some remarkable voyages. In the Middle Ages, warships were for the most part contrived out of hired merchant vessels, as and when required. These vessels, which were termed "round ships," were sturdy craft, relying for propulsion on a single mast and primitive sails. To convert them to fighting-ships, wooden platforms or "castles" were erected at bow and stern, whence is derived the term "forecastle," still

in use. The fighting men were for the most part concentrated in these castles. Tactics were elementary, and the ships were regarded as floating platforms from which the fighting could be conducted more or less on military lines. Even when Henry VII began to build his Royal Navy, his ships were essentially merchant ships, although some carried, for their day, a formidable armament. It was given to Henry VIII, in his *Henri Grace à Dieu* to produce a vessel which was to be the prototype of all future ships of the line. She was a striking vessel in every way, but her most novel feature was that she carried her heaviest guns between decks, firing through ports cut in her sides. The Elizabethan ships continued to embody her main features, but were handier and more seaworthy. In 1637 Charles I launched his *Sovereign of the Seas*, the first three-decker, that is to say, she mounted her heavy guns in three tiers. About the same year frigates were introduced. These were small, handy vessels which were employed as cruisers. By the latter part of the eighteenth century, the types of man-of-war had more or less crystallized. The line-of-battle ships, which were classified in three rates, carried from 64 to 100 guns according to rate. First and second rates mounted their guns in three tiers, third and fourth rates in two. The most common battleship type during the Napoleonic wars was the third rate "seventy-four." Up till about 1795 the heaviest gun was the 42-pounder, so called from the weight of the shot it fired, but this proved so unwieldy that it was replaced by the 32-pounder. These guns were mounted in the lowest tier, with 24-pounders on the deck above and, in three-deckers, 12-pounders in the upper tier. Fourth rates were ships mounting 50 guns in two tiers. The fifth and sixth rates were the frigates, which usually mounted from 20 to 38 9- to 18-pounders, and had a single gun-deck. All "rated" ships had three masts and were "full-rigged." A first rate such as Nelson's *Victory* had a burden of 2100 tons and carried a complement of 850 officers and men.

Steam Propulsion. The nineteenth century marked the beginning of an era of far-reaching change in the sphere of ship construction. Already steam had been applied successfully to the propulsion of small vessels, and in 1822 the first steam vessel was purchased for the British Navy. These early steamers were propelled by paddle wheels, which suffered from the twin drawbacks that they were extremely vulnerable and also interfered with the convenient disposal of the guns on the broadside. For some years, therefore, steam was only fitted in vessels of minor importance. But in 1842 the

From the original picture
by W. L. ...

THE BATTLE OF JUTLAND 31st May, 1916. 6.21 p.m.

Reproduction by courtesy of the United
Service Club from blocks loaned by the
Royal Naval School.



superiority of the screw propeller as a means of propulsion was clearly demonstrated, and the adoption of this device enabled steam to be installed in the more important vessels. By the time of the Crimean war the majority of the larger ships were engined, but as a means of propulsion steam was still regarded as an auxiliary. For many years to come, sail continued to be fitted in the larger ships, although, as time went by, in its turn it came to be considered the auxiliary means of propulsion. In 1869, however, the Admiralty took the ultimate step by laying down the sea-going turret battleship *Devastation*, in which all vestiges of sail were swept away and steam alone supplied the

in the earlier ships were heavy and inefficient, and about 1895 they began to give place to the much more efficient water-tube type. Right up to the years immediately preceding the World War, the fuel used was coal. In the early years of the present century, experiments were tried with heavy oil as a substitute. The results were so successful that after 1911 no more coal-burning destroyers for the British Navy were built, and in 1912 the first oil-fired battleships and cruisers were put in hand. At the present time all but a very few unimportant vessels burn oil.

Development of Weapons and Armours.

Next came the substitution of iron and then steel as the material for ship construction. The devastating effect of the Russian shells against wooden ships during the Crimean war had rendered the traditional material obsolete. With the new materials came armour plating. The French were first in the field, but in 1860 the Admiralty replied with the *Warrior* of 9210 tons and 40 guns. Her armour, of wrought iron, was 4½ in. at its thickest. In 1876 compound armour was introduced. This consisted of an outer layer of steel to give the requisite hardness, with a backing of iron to provide toughness. But the introduction of the Harvey (1895) and Krupp processes of treating steel enabled these qualities to be combined in steel plates, and in subsequent ships armour was made of this material alone. Armoured decks also began to make their appearance, either as a reinforcement to or in substitution for vertical armour. Owing to its tremendous weight—in a modern capital ship it accounts for perhaps a quarter of her displacement—the armour has to be graded in thickness according to the importance of the part to be protected, but in existing battleships it reaches a maximum thickness of 13 in. or more. Fig. 1 shows a midship section of a typical British battleship. At the present day, on account of the growing danger both from long-range plunging fire and aerial bombs, the tendency is to increase the thickness and extent of deck armour.

The introduction of the *shell* was only the first of the many improvements in ordnance. Raising of the gun bore was introduced to give the projectile greater steadiness in flight, and after some setbacks due to technical difficulties, breech loading was substituted for muzzle loading. In the 1860's the system of mounting heavy guns in *turrets*, instead of in broadside batteries, began to find favour. At first only the main armament was so mounted, and the secondary guns continued to be installed on the broadsides on handworked mountings, but in the latest British battleships the secondary

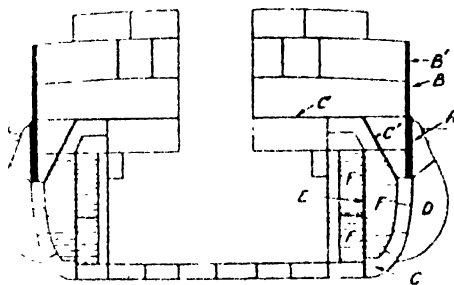


FIG. 1. MIDSHIP SECTION OF A TYPICAL MODERN BATTLESHIP

Showing system of protection against shell-fire, aerial bombs, torpedoes and mines.

(A) Main armoured belt, 13 in. thick. (B) Upper armoured belt, 6 in. thick, extending upwards (B') to cover the 6-in. gun battery. (C) Protective deck, sloping down below the level of the water line. (D) Anti-torpedo "bulge." (E) Longitudinal protective bulkhead (F) Oil fuel tanks. (G) Double bottoms.

motive power. A few more masted ships were built, but by 1882 steam held the field. The engines of the early steamships were arranged on the reciprocating principle, and machinery on this plan continued to be installed up to the end of the century. But by 1897 the Parsons steam turbine made its appearance, and after a period of trial, turbine machinery was generally adopted. The first British capital ship to be driven by turbines was the *Dreadnought*, which was launched in 1906. In the British and most other navies the *geared* turbine still holds the field. The United States Navy, however, for its larger vessels has adopted the *turbo-electric* drive. In this type of installation, the propellers are driven by electric motors, which in turn are supplied with current from a number of generators driven by steam turbines. The Germany Navy has gone even further, and in its "pocket" battleships it has discarded steam altogether and adopted internal combustion engines. Time has yet to demonstrate the success or otherwise of this innovation. The "tank" boilers fitted

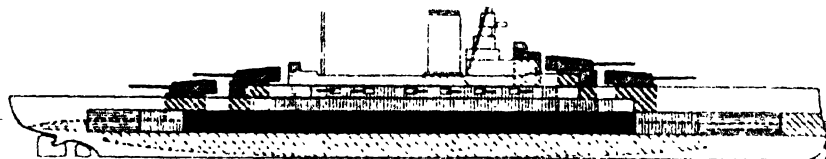
guns also are in turrets. The quick-firing guns for the secondary and anti-torpedo boat armaments of large ships and the main armament of smaller ships also underwent considerable development.

For the last forty years of the eighteenth century the ram also made its reappearance. Great hopes were at one time placed on this weapon, and it was employed effectively in the Austrian defeat of the Italian fleet at Lissa (1866), but the increasing range of the gun, the introduction of the torpedo, and new tactics caused it to be discarded.

their development, and they are now capable of the most extended operations.

At the accession of King Edward VII, the typical British battleship was a vessel of about 15,000 tons and 18 knots speed. She was armed with four 12-in. guns in turrets, and twelve 6-in. guns on the broadside, plus an anti-torpedo armament of 12- and 3-pounders. She had a maximum thickness of armour of 9 in., and carried a complement of 750 men.

The frigate in due time gave place to the cruiser (which see). Like the battleship,



Thickness of External Plating in Inches

DIAGRAM OF TYPICAL BRITISH BATTLESHIP SHOWING DISPOSITION OF ARMOUR PLATING.
(Royal Sovereign Class)

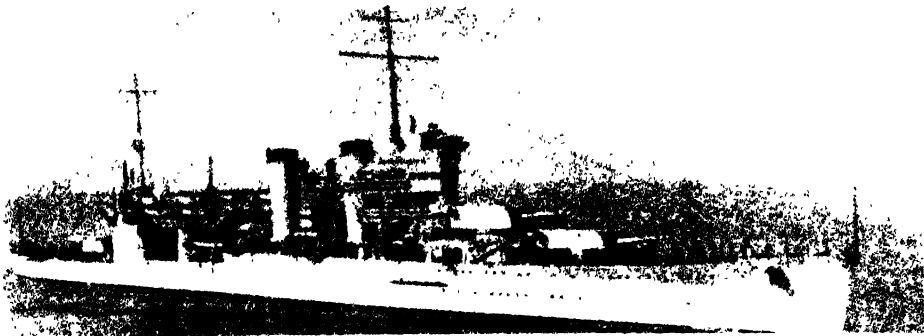
NOTE - External plating is indicated by hatching in full lines, internal plating by hatching in broken lines.

The *mine* (which see) had already been in use for some time when, in 1864, Whitehead produced his locomotive *torpedo* (which see). The introduction of this weapon had far-reaching effects. As a first result, it led to the introduction of the torpedo-boat (which see). In order to combat these vessels, the bigger surface ships had their armament increased by a large number of light quick-firing guns and were equipped with powerful searchlights. As torpedo craft increased in size, so did the guns of the anti-torpedo armament, until now guns up to 6 in. are mounted for this purpose. Greater attention was also paid to the under-water protection of large surface ships. Watertight subdivision was immensely improved, and such devices as the anti-torpedo "bulge" were also developed. For a time ships were provided with torpedo nets which could be rigged out from their sides on booms, but these were found to be of little value and to be in some ways a danger, and by the end of the war all navies had discarded them.

The invention of the torpedo provided an effective weapon for the *submarine*. The first British vessels of this type were brought into service in 1901. At the outset, they were regarded purely as coast defence craft, and they were still looked upon very much in this light when the World War broke out. But the experience gained during this struggle gave a tremendous impetus to

cruisers went through a period of fluctuation, but by 1888 their general features had stabilized. The ships built during the following ten years were of the *protected* type, that is, they had practically no vertical armour but depended for their protection entirely on a thick armoured deck. They were divided into three classes, ranging from about 2000 tons with eight 4-in. guns to 14,440 tons with two 9.2-in. and sixteen 6-in. Speeds varied between 20 and 22 knots. But in 1898 side armour for large cruisers was generally adopted, and the first class protected cruiser gave place to the *armoured cruiser*. These ships were constructed on much the same plan as the contemporary battleships, except that they were about 4 knots faster, their armour was thinner, and instead of four 12-in. guns they carried two 9.2 in. They were formidable vessels, and as the Russo-Japanese War proved, were capable at need of taking their place in the line of battle.

Twentieth Century. The opening years witnessed several important developments. In the first instance these took the form of increasing the calibre of the secondary armament. Thus the Germans, in the *Deutschland* class battleships, substituted the 6.7 in. for the 5.9-in. gun. Britain and other Powers went even further, and in the British battleship *Lord Nelson*, a typical vessel, the secondary armament was composed of ten 9.2-in. guns mounted in turrets, five on



UNITED STATES CRUISER "NEW ORLEANS"

Photo: Wright & Logan

rather broadside. It was only a step further to the reintroduction of the "all-big-gun" principle. In 1905 Britain laid down the battleship *Dreadnought*, which was to have a main armament of ten 12-in. guns mounted in five turrets, and the following year the United States commenced the two ships of the *South Carolina* class with eight 12-in. guns. In these vessels the only other guns were a number of 3-in. for anti-torpedo-boat purposes. These weapons were soon seen to be too small, and the British adopted in succession the 4-in. and then the 6-in., while the Americans decided for the 5-in. The Germans went straight to the 5.9-in., supplemented by a number of 3.4-in. In the British and American navies the calibre of the main armament guns increased by steps from 12 to 15 or 14 in. and, after the war, 16 in., the number of guns mounted tending to decrease slightly with increase of calibre. The Germans favoured a rather smaller calibre—11 in. at first and then 12 in.—but later they increased to 15 in. In their newest ships they have had perforce to revert to 11 in. Some tendency to increased armour protection was also evinced—the *Dreadnought's* main belt was 11 in. thick. More noticeable was the increase in speed, which in the *Dreadnought* was 2½ knots greater than in her predecessors. The British battleships *Nelson* and *Rodney* (completed 1927),

the most powerful in the world, have a main armament of nine 16-in. guns mounted in three turrets, supplemented by twelve 6-in. guns in six turrets, and six 4.7-in. anti-aircraft guns. They have a designed speed of 23 knots and a maximum thickness of armour of 14 in. They displace 33,500 tons, and their complement is 1300 officers and men. The two 34,000-ton battleships mounting 14 in. guns, planned for 1937, are to be effective anti-aircraft ships.

Recent Trends. Armoured cruiser design followed generally that of battleships. In 1906 Britain laid down the *Inflexible*. Of approximately the same displacement as the *Dreadnought*, she was designed for 25 knots speed, though in the event this was much exceeded. Her main armament consisted of eight 12-in. guns, and her greatest thickness of armour was 7 in. This ship and her immediate successors were first styled "armoured" cruisers, but later they were reclassified as "battle" cruisers. The only other navies in which the type was adopted were the German and Japanese, although but for the Washington Treaty, the United States would have constructed a number. The *ne plus ultra* of battle-cruiser design was reached in the British *Hood* (completed 1920) of 41,200 tons, 31 knots speed, armed with eight 15-in. and twelve 5.5-in. guns and with armour 12 in. thick at its maximum.



H.M.S. "CYGNET," DESTROYER

Photo: Greys

The latest developments in cruiser design reflect the terms of the Washington and London Naval Treaties. There are two distinct types, the larger running to a displacement of about 10,000 tons and about 32 knots speed. These ships are armed with eight to ten 8-in. guns mounted in turrets. Owing to limitations of weight, their protection has tended to be somewhat light, and they have been much criticized on these grounds. The smaller type displaces about 7000 tons with eight or ten 6-in. guns. Speed remains at about 32 knots, and rather more attention is being paid to armour protection. Both these types of cruiser have a very large radius of action. Britain and the U.S.A. have (1936) under construction a class of cruisers displacing from 8500 to 10,000 tons and armed with twelve to fifteen 6 in. guns.

The introduction of aircraft has also had its influence on naval construction. In capital ships and cruisers it has resulted in increased protection being given against bomb attacks, and in provision of anti-aircraft guns. In 1935-6 two British cruisers were converted to specialized anti-aircraft ships. There is thus a resemblance between the defensive measures taken against aircraft attack and those adopted in earlier years against torpedo craft.

It also gave rise to the *aircraft-carrier* (which see). The majority of carriers at present in service were converted from ships originally designed for other purposes, but

new carriers are being constructed which have been solely designed for this purpose. The outstanding feature of the carrier is the extensive flying deck. High speed she must also have, in order that she may manoeuvre for her aircraft to fly off or land, and yet be able to resume her station with the fleet. A great drawback to the type is its extreme vulnerability. Ideas as to the most suitable armament for carriers are diverse. The largest American and Japanese vessels carry eight or ten 8-in. guns; on the other hand the latest British ships have nothing larger than 4.7-in.—sixteen of them—which are primarily anti-aircraft weapons. The present tendency is to reduce the calibre of the guns mounted in these ships.

The growing importance of aircraft to the fleet has led to the introduction of catapults for launching aeroplanes. Aircraft so launched cannot return to their ships, but must land on the sea, on a carrier, or on land, according to type. All new cruisers are being fitted with catapults, which are also being installed in capital ships as they come in hand for reconstruction. The number of catapults fitted varies from one to four according to class of ship and nationality.

NAWAB, *nā wawb'*, or **NABOB**. The title of certain Mohammedan rulers in India. In the flourishing days of the East India Company the second term was used for wealthy Anglo-Indians.

NAZARETH. See **PALLSTINE**.



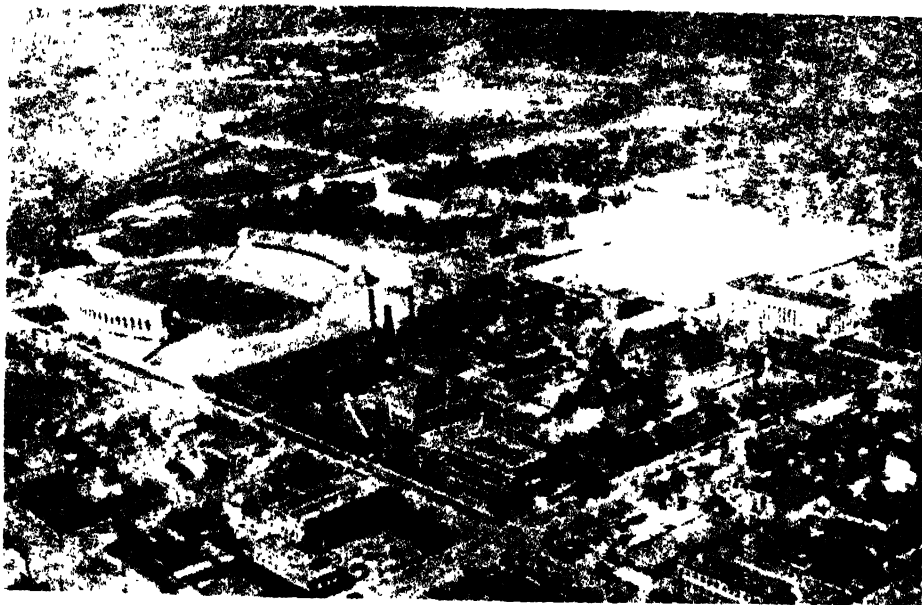
NEANDERTHAL FAMILY: A MUSEUM RECONSTRUCTION

Photo: Field Museum of Natural History

NAZI, *nah't se*. The shortened form of the name of the political party (*National-sozialistische Deutsche Arbeiterpartei*—National-Socialist German Workers' Party) which assumed complete control of Germany in 1933-34 under its leader, Adolf Hitler. The official Party Programme (1920) consists of 25 "points." The chief of these are: abolition of the Peace Treaties; unity and purification of the German race; territorial expansion (colonies); divided ownership of land and prohibition of speculation; education in the idea of the State and compulsory

The Neanderthal men, as far as may be judged from existing remains, were a squat, thick-set people. They had heavy jaws and powerful teeth. They had backward-sloping foreheads with heavy brow ridges, but a large brain cavity; they knew how to make stone tools, and they buried their dead.

It is unlikely that the Neanderthal men are part of modern man's family tree, for they had many features that are not represented in the present human types. They were succeeded, and probably exterminated, by the Cro-Magnon race. See ANTHROPOLOGY.



AERIAL VIEW OF NEBRASKA

The University Stadium can be seen on the left.

physical training; formation of a national army; "Positive Christianity"; and unconditional authority of the State over the entire nation and its organization.

NEANDERTHAL MAN, *ne an' der tahl*, also spelled NEANDERTAL. The Neanderthal men are believed to have been the first cave-dwellers, a race who lived 30,000 to 60,000 or more years ago, in the first part of the Stone Age. The name Neanderthal is derived from the limestone valley of the Neander in Rhenish Prussia, in which, in 1856, anthropologists discovered the first skeletons representative of these people. Since then other skeletons and parts of skeletons have been found, principally in France, but also in Belgium, in Bohemia and Moravia, at Gibraltar, and recently in Palestine. Usually, these remains are discovered in caves used as burial-places.

NEAP TIDES. See TIDES.

NEBO. A god of the Assyrians and Babylonians. The name appears in cuneiform inscriptions (which see) as Nabu and Nabium, and from translations appears to mean "proclaimer, or announcer." It is believed, therefore, that Nebo was concerned with oracles.

NEBRASKA. A prairie state of the U.S.A., with an area of 77,520 sq. miles, and a population of 1,377,963 in 1930. Omaha, with 214,006 inhabitants in 1930, is the largest city, followed by Lincoln, Grand Island, Hastings, North Platte, and Fremont. Nebraska lies in the region of the Great Plains, at the base of the east slope of the Rocky Mountains.

Although the western part of the state is dry and in former times belonged to the Great American Desert, it is everywhere underlaid with water, which is used for

irrigation. East of the high plains and north of the Platte River are the grass-covered sandhills; the water absorbed by their porous, sponge-like soil forms many streams, springs and lakes, and this is the principal cattle-grazing area. In the central part are grassy prairies merging into fertile farmlands.

The Missouri flows along the entire eastern border, and, with its tributaries, it drains

Manufactures. Agriculture is the basis of the state's manufactures and commerce. Slaughtering and meat-packing has become by far the most important industry.

Government. The constitution has three times been revised.

The *legislative body* consists of a senate and house of representatives.

The *executive authority* is vested in a Governor, Lieutenant-Governor, Auditor, Secretary of State, Treasurer, Attorney-General, Superintendent of public instruction, and Commissioner of public lands and buildings.

The *judicial department* comprises the supreme court, district courts, county courts, justices of the peace, police magistrates, and such inferior courts as are created by law.

NEBUCHADNEZZAR, *neb u kad nez' ar*. A king of the Chaldean, or New Babylonian, Empire, in whose reign (604-561 B.C.) Babylon became one of the most splendid cities of the ancient world. He was the son of Nabopolassar, who founded the empire. Much of the history of Nebuchadnezzar is related in the Old Testament, in Kings, Jeremiah, and Ezekiel. To punish the Jews for their repeated revolts, he laid siege to Jerusalem, and in 586 B.C. captured that city. The Jews were carried away by him into what is known as the "Babylonian Captivity."

Nebuchadnezzar also carried on an unsuccessful siege of the Syrian city of Tyre. An inglorious invasion of Egypt was another of his military exploits. The Great Palace in Babylon, the famous Hanging Garden, the walls encircling the city, magnificent fortifications, and a great temple bore witness to him. Nebuchadnezzar died at the age of eighty-four, and with him passed away the splendour of Babylon. See **BABYLON**.

NEBULA. The Latin for "mist," and the name astronomers apply to certain hazy masses among the stars. In general, we may define nebulae as huge masses of gaseous or partly gaseous matter, within the Galactic System but far beyond the limits of the solar system; or as vast aggregations of stars, beyond the Galaxy and so distant that they cannot be observed singly, even with the most powerful telescopes—i.e. as "island universes."

There have been various methods of



RUINS OF NEBUCHADNEZZAR'S PALACE, BABYLON

Photo: U. & U.

the state. Its largest branch is the Platte River.

Climate. The atmosphere is dry, and the climate exhilarating. Extremes of heat in summer and of cold in winter are common.

Agriculture. Nebraska is pre-eminently an agricultural state. In the eastern section, great crops of maize, wheat, oats and hay are produced, and in the west and north-west regions, grasses grow in abundance.

Apples are the most important of the orchard fruits; cherries, plums, grapes and small fruits, especially strawberries and blackberries, are also grown.

classifying the nebulae. A recent classification divides them into three groups, the first two of which are Galactic—

(1) Vast clouds of dust-like particles called *dark nebulae*. These nebulae, by



NEBULA IN ANDROMEDA
Photo: Visual Education Service

hiding the stars in certain parts of the Milky Way, have produced the dark spots in the Galaxy.

(2) *Luminous nebulae* in the Milky Way, including diffused chaotic masses like the nebula in Orion, and rounded forms called *planetary nebulae*. These are associated with stars, and probably derive their light from them.

(3) The *spiral nebulae*, the most numerous of the nebular masses, are nebulae only in appearance. These cloud-like objects, lying far outside the region of the Milky Way, are not true nebulae, but are great aggregations of stars that have condensed out of nebulae. The one that appears largest to us, the spiral nebula in Andromeda, is about 1,000,000 light-years from us, but it is visible to the naked eye. The faintest ones visible through the largest telescopes are thought to be 140,000,000 light-years distant. Thus the stellar universe, of which our Milky Way forms the basic plane, is but one of many stellar universes. See ASTRONOMY.

NEBULAR HYPOTHESIS. Name given of a theory advanced by Laplace (1749-1827) to account for the formation of the solar system. According to him, the sun and all the planets were formed out of a nebula, or cloud of intensely heated gas, which under the action of gravitation assumed a globular form. The mass gradually condensed and decreased in size, while the velocity of rotation increased. Its whirling motion tended

to flatten the globular mass at the poles; the continuing contraction then caused rings of nebulous matter to become detached and to be thrown off into space, as in the case of the rings of Saturn. The matter detached eventually collected into a globe, which continued to revolve around the central nebula from which it was cast off, as the moon revolves round the earth.

This theory was first suggested by Swedenborg, and then by Kant, and later was elaborated by Laplace, with whose name it is now identified. It has been abandoned in the light of new discoveries and keener analysis of known phenomena.

NECK (GEOLOGY). The consolidated material filling the vent of ancient volcanoes, exposed by the denudation of the volcanic cone. Of volcanic rocks the most famous are those of the diamond mines of Kimberley, but they are common in all ancient volcanic areas, e.g. Arthur's Seat, Edinburgh; in the Auvergne, and in the Eifel, while again there are necks of dolerite penetrating the chalk in Antrim.

NECK. The part of the body which connects the head with the trunk. Among the many structures of which it is composed, some are of vital importance for life. Such are the large arteries and veins which supply the head; the gullet, through which food passes to the stomach; the air passage connecting with the lungs, including the voice-box or *larynx*; and the spinal cord, which, with the brain, is part of the central nervous system. The head is supported on the spinal column, the upper seven bones or *vertebrae* of which form part of the neck. The number of vertebrae in the neck is the same, viz. seven, in all mammals, whether the neck is long, as in the giraffe, or short, as in the whale.

NECKER, JACQUES (1732-1804). Necker was born in Geneva, of Swiss parents. Having acquired a reputation in France as a financier, he was made Director-General of Finance in 1777 by Louis XVI.

His publication of a statement as to the financial condition of France displeased the king, and in 1781 brought about his dismissal.

Necker was recalled by Louis in 1788 to



NECKER
Photo: Brown Bros.

the offices of Director-General of Finance and Minister of State; and he attempted to pass measures of reform. His dismissal by the king in July, 1789, was the direct cause of the storming of the Bastille. This brought about his reinstatement, but he held office only until September, 1790, resigning because of the rejection of some of his financial schemes. Madame de Staël, the noted French writer, was Necker's daughter. See LOUIS XVI.

NECROMANCY, *nek' ro man si*. A term derived from Greek words meaning "corpse" and "divination," and applied to the primitive belief that the future may be revealed by communication with the spirits of the dead.

NECROPOLIS, *nek rop' o lis*. A large cemetery used by prehistoric peoples to bury the bodies of their dead, together with weapons, personal belongings, etc. The term is from the Greek for "city of the dead." Egypt is pre-eminent the land of the necropolis. Every ancient centre of royal authority—as Memphis, Thebes and Saïs—has a "city of the dead" which surrounded all the pyramids (the tombs of the kings) and temples.

An interesting necropolis has been found in South America at Ancon, Peru, dating back to the days of Inca rule. At Hallstatt, Austria, is a necropolis of the Bronze Age. What is known of the Etruscans is derived from a study of their ancient cemeteries,

such as those at Veii, Tarquinii and Clusium. See ARCHAEOLOGY.

NECTAR. A sweet substance found in many flowers, attractive to all insects but especially to bees, by whom it is collected and made into honey. The insects, passing from flower to flower, help to bring about cross-fertilization by transferring pollen from one to another. See FLOWERS.

In Greek mythology, nectar was the drink of the gods, in which they pledged one another. With ambrosia, the "food of the gods," it conferred youth, beauty and immortality. See HEBE.

NECTARINE, *nek tar een'*, or *nek' tar in*. A smooth-skinned variety of peach, produced on peach trees through seed and bud variation. Besides the downless skin, nectarines have a harder flesh than peaches and are smaller; there are also slight differences in the flowers. Their culture is similar to that of the peach (which see).

Classification. The botanical name of the nectarine is *Prunus persica* var. *nucipersica*.

NEEDLE. A metal instrument pointed at one end and used in sewing, knitting, net-making, etc.

The process of needle manufacture has been brought to great perfection. The coil of steel wire from which needles are made are cut into pieces long enough for two needles. These pieces are then heated to a dull red and rolled on a flat steel plate to straighten



MAKING THE EYES OF NEEDLES

Photo. Henry Millard



THE STICKING SHOP

Needles are stuck into cloth before packing

Photo: Henry Mucard

them. The wires are pointed at each end on a grindstone, being held in place by a device which causes them to revolve while in contact with the stone, so that the points are fine and even. Only one end is pointed at a time.

The wires are next dealt with by a machine which first makes an impression of the eyes and then pierces them.

The eyed and pointed wires are next broken in the middle, and the heads are then rounded and smoothed on grindstones.

England, especially Redditch in Worcestershire, is the chief centre for the manufacture of hand-sewing needles, and these needles are the finest in the world. Sewing-machine needles are mainly made in the United States.

Some needles used in sewing shoes are curved, forming a part of a circle; some used by surgeons are also curved.

Thorns and pointed sticks were used by the ancients, and needles of bone are still employed by uncivilized peoples.

NEEDLE-POINT. See LACE.

NEEDLES, THE. See WIGHT, ISLE OF.

NEEDLEWORK. The art comes under a variety of headings, e.g. darning, running, felling, gathering and whipping; for any of these cotton, thread, wool or silk are used, and may be worked either by hand or machine. Needles employed to-day are made of fine Sheffield steel, delicately pointed at one end, with a hole pierced at the other which is called the eye; but primitive man

practised the art of weaving with needles made from bone. Examples of Egyptian embroidery date back to the sixteenth century B.C. This art was first introduced into Europe from Byzantium, where exceptionally fine work was produced. It is still a considerable art among the people of the East. Embroidery flourished greatly during the Middle Ages and later became general in domestic life. English embroidery was held in great esteem by other countries in medieval times. Embroidery upon linen gradually gave way to brocades and woollen fabrics, and more time was spent on woollen coverings for furniture and cushions. During the latter part of the sixteenth century and into the eighteenth century the embroidering of samplers became popular, the linen used being later replaced by a loosely woven woollen material or canvas, and the material for embroidering being either wool, cotton, or silk.

Since the establishment of the Royal College of Needlework at South Kensington in 1870, design has notably improved.

NEGATIVE. See PHOTOGRAPHY.

NEGATIVE QUANTITY. A quantity taken in a sense opposite to that chosen as positive. For example, if a shilling owned be declared to constitute a positive quantity, then a shilling owed will be a negative quantity. If a number of degrees above zero on the thermometer be thought of as positive, the corresponding number of degrees below will

be negative, and so on. The mathematician indicates where negative quantities occur by the symbol —. He finds their use desirable whenever he is dealing with magnitudes which can be taken in one of two opposite senses or directions, such as motion up or down, to the right or left, forward or backward, distances to east or west, above or below, temperatures, forces in one direction or its opposite gain or loss, etc. See ALGEBRA.

NEGLIGENCE. Failure to exercise care where care is due. In law, no degree of negligence can be a criminal offence unless it results in the death of a human being, in which case the negligent person may be found guilty of manslaughter. Otherwise the remedy of anyone injured by the negligence of another is an action for damages. Actionable negligence has been defined as "the neglect of the use of ordinary care and skill toward a person to whom the defendant owes the duty of observing ordinary care and skill, by which neglect the plaintiff, without contributory negligence on his part, has suffered injury to his person or property." What is "ordinary care and skill" will depend on circumstances; e.g. anyone undertaking professional work is expected to display that degree of care and skill which is ordinary in his profession. In an action arising out of a collision between ships, where the Court considers that there was negligence on both sides it can apportion the blame and make each ship bear a part of the loss. This is a special rule of Admiralty Law, and is known as contributory negligence.

In all other cases where both parties to an accident are negligent, neither can recover anything. This does not apply if, while the plaintiff was guilty of negligence, the defendant's negligence was the sole direct cause of the accident.

NEGOTIABLE INSTRUMENTS. The rule of English Common Law is that only the owner can divest himself of property. This rule conflicts with the custom of merchants: trade cannot be conducted with confidence if traders are constantly to be occupied by suspicion. From very early times, therefore, mercantile custom decreed a good title to the trader who acted in good faith. In regard to negotiable instruments, mercantile custom has gained a complete victory over the Common Law rule—a victory that has its statutory recognition in the Bills of Exchange Act, 1882.

These negotiable instruments are, in essence, written evidence of debt. They include *Bills of Exchange* (including *Cheques*, which are Bills of Exchange drawn on a banker), *Promissory Notes*, *Bearer Bonds*, and other securities that the custom of

merchants has made negotiable by delivery. By these documents the merchant makes, in one way or another, a promise to pay. He may, for instance, "accept" a bill: he writes his name upon it, thereby acknowledging his debt and undertaking to pay it. His creditor may transfer the document in order to cancel his own debt. The document thereby becomes mercantile currency, and he who takes it in good faith and for value has a right to enforce payment upon it. Nor is any counter-claim possible upon him in regard to it: however defective the title of the former possessor, he (the "holder in due course") gets a perfect title.

It is this immunity from risk that distinguishes a negotiable instrument from an instrument that is merely transferable.

NEGRILLOS, *neg ril' ôz*, or **NEGRITOS**, *neg re' lôz*. Negroid races found chiefly in the Philippines, the Andaman Islands, the Malay Peninsula, and Equatorial Africa. They belong to the pigmy type. See PYGMIES.

NEGRO. One of the main divisions of the human race; generally characterized by much skin pigment, woolly lustreless black hair, thick lips, large dark eyes, and a depressed nose with everted nostrils. The negroid races were probably more widely spread in the Old World in the early days of man and may well represent one of the earliest human developments. Melanesians, Tasmanians (now extinct) and certain tribes of south-eastern Asia show distinct negroid affinities. But Africa has been the chief area of their development, though many tribes in the East show strong Hamitic and Semitic admixtures. The Bantu negroes of the south show slight Hamitic



NEGRITOS
Sakai mother and child.
Photo: Malayan Information Agency

influence. The most primitive negroes are the Bushmen and Hottentots, and the most typical ones the West African negroes.

The good-natured, placid and docile negro has long been exploited by more energetic and ambitious peoples. The ancient world, especially the Romans, enslaved many African negroes, and the Arabs were ruthless slavers, but the English, Portuguese and Spaniards were not less savage in their transport of negroes to the Americas in the seventeenth, eighteenth and early nineteenth centuries. The slave trade accounts for the whole of the large negro population in the New World. In no part of their domain, except in the West African Republic of Liberia and the two small West Indian Republics of Haiti and Santo Domingo, have the negroes self-government. See RACES OF MAN.

NE'GUS. The native title of the emperors of Ethiopia or Abyssinia, the full title being *Negusa nega* "meaning King of kings. Haile Selassie, dethroned in 1936, was the last of the reigning line of Amharic rulers who had held the title for about two centuries. See ETHIOPIA.

Negus is also the name of a drink common in the early eighteenth century, and named after its inventor, Colonel Francis Negus (died 1732). It was usually made of port, mixed with a little lemon juice, sugar, spices and hot water.

NEHEMI'AH. A Jew born during the Babylonian captivity. He was made governor of Judea, and an account of his work is given in the Bible in the Book of Nehemiah.

NEHRU, nar' u. The name of two Nationalist leaders of India.

Motilal Nehru, PANDIT (1861-1931). A wealthy Brahmin, the Pandit Nehru had a flourishing lawyer's practice at Allahabad, but gave it up after the publication of the Montagu-Chelmsford report, to lead seditious agitation against the British Government. In 1919 he began the publication of a political newspaper, *The Independent*. He supported Mahatma Gandhi in his civil disobedience movement and became the leader of the Swaraj party. He organized the boycott of the Simon Commission, publishing in 1928 the *Nehru Report* of very different tone.

Jawaharlal Nehru, PANDIT (born 1889), son of the above. In 1929 he was President of the Congress at Lahore. He has expressed himself forcibly in favour of boycotting British goods. He was present at Gandhi's march to the sea at Dandhi when the salt tax law was symbolically broken by the evaporating of salt water. He was sent to prison for six months in 1930 and again in 1931. On his release he declared his con-

version to Communism. He is the political chief of the Congress party, while the Mahatma keeps his great spiritual influence.

NEJD, nezhd. A part of the KINGDOM OF SAUDI ARABIA. The home of a warlike people called the Wahhabis, whose rise to supremacy in Arabia was due to their Sultan, Ibn Saud. Nejd lies east of the Hejaz, which Ibn Saud conquered in 1925, and made a vassal state. In 1932, the Hejaz and Nejd became officially the Kingdom of Saudi Arabia, with Ibn Saud as king. The population is about 3,000,000. See ARABIA.

NEKTON. The name given to the larger forms of life in the sea to distinguish them from the lesser types (see PLANKTON). Nekton include fishes, seals, whales, etc.

NELEUS, ne' lūs. The father of Nestor. See NESTOR.

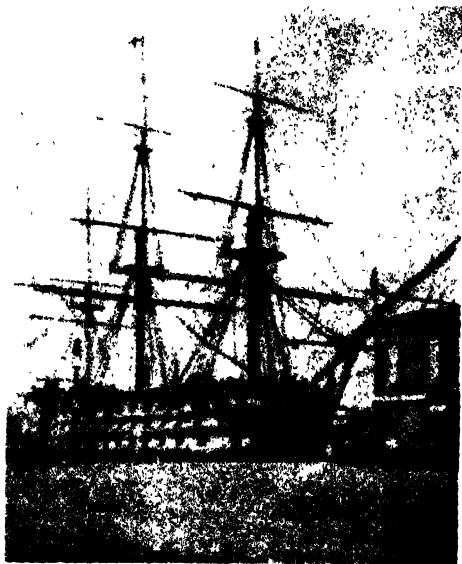
NELSON. The Borough of Nelson (3466 acres) is centrally situated in the north-east Lancashire cotton-weaving district, and had a population of 38,304 at the 1931 census. The L.M.S.R. and the Leeds and Liverpool Canal pass through the town, and there are main roads connecting with Burnley, Blackburn, Preston, Manchester and the West Riding of Yorkshire. Until the coming of the power loom, Nelson was a small village, but with the awakening of Lancashire to the prospects of cotton manufacture, the population grew rapidly, and Nelson took its place as one of the leading cotton-weaving towns. Its industries to-day are mainly cotton- and rayon-weaving and allied trades.

NELSON OF THE NILE, HORATIO, VISCOUNT, DUKE OF BONTÉ (1758-1805) Horatio Nelson was born at Burnham Thorpe, Norfolk, where his father was rector. His mother was a descendant of the famous Walpole family. Little is known of his childhood.

Though the boy was delicate and small for his age, he had an ambition to go to sea. So when his maternal uncle, Captain Maurice Suckling, set sail for the Falkland Islands, Horatio, who was only twelve, accompanied his uncle, and it was to his guidance that Nelson owed the excellence of his training. Promotion then depended much on influence. Suckling became Comptroller of the Navy and was able to help him at the start.

When fifteen Nelson went on an expedition toward the North Pole. A little later, a trip to the West Indies resulted in a fever, which left his health seriously undermined. At nineteen, the commission of second-lieutenant was given to him; in 1778 he was made commander, and in the following year post-captain.

In the West Indies. In 1783 Nelson was given command of the *Boreas*, stationed in the West Indies, and he served there until



H.M.S. "VICTORY" AT PORTSMOUTH
Photo. Topical

1787. He disregarded the orders of his commander, Sir Richard Hughes, who forbade him to enforce the Navigation Laws against America. The States were trading with British possessions as if they had still been loyal colonies, and the West Indian merchants had bribed the authorities. Nelson, who was supported by Captain Collingwood, was undoubtedly in the right, and his disobedience was upheld by the Admiralty, but he appears to have been marked as a potential nuisance, for from 1787 to 1793 he was on the retired list. War then broke out with France, and, in command of the *Agamemnon*, he joined the Mediterranean fleet. He was promptly sent to blockade the principal strongholds of Corsica. At Calvi, one of the blockaded ports, he received a wound which deprived him of his right eye.

First Battles. Nelson next fought at the Battle of Cape Saint Vincent (1797), and was rewarded by knighthood of the Order of the Bath; just before this combat, he had reached by regular promotion the rank of Rear-Admiral. He suffered now his first defeat in a boat attack on Santa Cruz; and lost his right arm.

At St. Vincent he had again acted on his own responsibility, for he had altered course without waiting for orders and so made the victory more complete. His commander, Sir John Jervis, later Lord St. Vincent, praised his conduct highly.

When convalescent, Nelson was sent to

watch the French ships at Toulon. Because of a mishap they escaped, and Nelson started in pursuit, finally defeating the fleet in the Bay of Aboukir.

After this, which he regarded as technically his most perfect battle, he was created Baron Nelson of the Nile.

Nelson now landed at Naples, where he was received in triumph by the Bourbon king, by the people, and by the English Ambassador, Sir William Hamilton. Emma, Sir William's wife, an emotional, enthusiastic woman and a famous beauty, deluged him with congratulation and flattery. Nelson found her irresistible.

He had intervened to aid the King, to whom the lower classes were loyal, but who was in danger from aristocratic republicans and their French allies. The influence of Emma now made him devote himself to Neapolitan affairs. His ships transported the royal family to Sicily. The King made him Duke of Brontë and Commander-in-Chief of the Neapolitan Navy, in which capacity he arranged for the court-martial by Neapolitan officers of Admiral Caracciolo. The Admiral's hanging has been described as an act of cruelty to a noble old patriot, but Caracciolo's treachery warranted death.

Dislike of Admiral Keith, now his superior in the Mediterranean, reluctance to leave Lady Hamilton, and a genuine desire to aid the King of Naples, England's ally, all combined to make Nelson disobey orders to join Keith. He was granted sick-leave and re-



THE TOMB OF NELSON IN THE CRYPT OF ST.
PAUL'S CATHEDRAL
P. & A.

turned to England in triumph with the Hamiltons. Emma shared his ovations, and Lady Nelson left him.

Copenhagen and Toulon. In 1801 Nelson was made Rear-Admiral, and under command of Admiral Parker, sailed for Copenhagen. The British claimed the right to search neutral ships for contraband of war, which Denmark, supported by Russia, refused. After a council of war, Nelson was appointed to make the attack on the Danish fleet. When Parker saw what appeared to threaten an unfavourable outcome, he gave the signal of recall. Nelson, disregarded the order, and secured victory. He claimed that he had been unable to see Hyde Parker's signal; he had, in fact, put his telescope to his blind eye. This battle was of great political importance, as it prevented the French fleet from gaining the support of the admirable Baltic navies.

In May, 1803, as Commander-in-Chief in the Mediterranean, Nelson hoisted his flag on the *Victory* and began the blockade of Toulon. This was one of his finest achievements, as remarkable as any of his battles. Ships in those days were insanitary and uncomfortable, so that sick-lists were usually long. The crews were mostly reluctant victims of the press-gang, or else criminals. Yet for two years the British fleet kept at sea off Toulon, and during that time there was practically no sickness and practically no "crime." This was the work of the Admiral, who carefully planned the diet, including plenty of vegetables, fruit and wine.

In 1805 Admiral Villeneuve avoided the blockade and sailed for the West Indies.

When the French fleet slipped out of the harbour of Toulon, he began the pursuit; which ended in the Battle of Trafalgar. The French and Spanish fleets were destroyed by twenty-seven English vessels. It was the greatest conflict of the age, but Nelson received his death wound, living only long enough to know that he had won. See NAVY.

Nelson Monument. The great monument erected to the memory of Lord Nelson in Trafalgar Square, London, was built by Colonel Bar-
randon, a Frenchman.

NEMATODA, *nem a tō' da*. See ZOOLOGY.

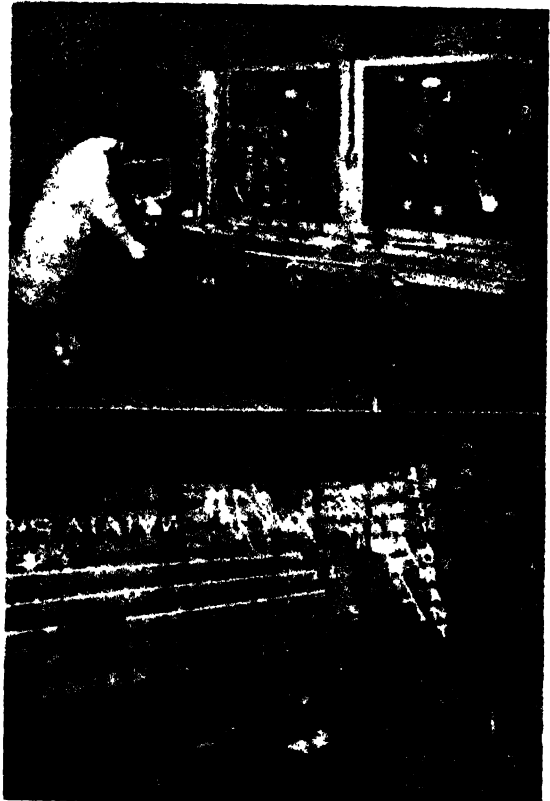
NEMEAN, *ne me' an* or *ne' me an*, GAMES. One of the four Greek national festivals, held at the shrine of Zeus, in the valley of Nemea in Argolis. The Nemean games were cele-

brated every other year in midsummer, and the competitive exercises were athletic contests, horse-racing, and playing the cithara. Each winner was given a palm branch and a crown of parsley. The first series of games recorded in the historical period were celebrated in 573 B.C.

NEMESIS, *nem'e sis*. In Greek mythology, the goddess of vengeance, who represented the just anger of the gods. She punished evil-doers, especially those who were proud or insolent.

To-day the word *nemesis* means retribution or retributive justice.

NEMOURS, *ne' moor'*, DUKE OF. A title



NEI SIGN MANUFACTURE

Above: Pumping apparatus for extracting air from the tubes, filling them with the desired gas, and carrying out the bombarding process. Below: Testing signs under actual electrical conditions.

Photos: Claude-General Neon

held in the fifteenth and sixteenth centuries by various houses related to the royal line of France. Louis XIV conferred it on his brother Philippe, Duke of Orleans. From Philippe was descended Louis Philippe, King of the French, who granted the title to his second son.

Louis Philippe Charles Raphael, Duke of Nemours (1814-1896), was put forward as a possible King of Greece in 1825 and of Belgium in 1831, in which year he had fought in the Belgian Army against Holland. He also saw service in Algeria. In the revolution of 1848 he escaped to England, where he long endeavoured to heal the breach between the Legitimists and the Orleanists.

NEODYMIUM, *ne o dim' ium*. See CHEMISTRY (Table of Elements).

NEOLITHIC, *ne o lith' ik*, AGE. See STONE AGE.

NEON. A gaseous element found in the atmosphere in the proportion of twelve parts in a million. It was discovered by Sir William Ramsay, an English chemist, in 1898, who observed a gas evaporating from a vessel of liquid air. He named this gas *neon*, meaning "new." It was not until 1910 that the first commercially practicable neon tube was produced. See illustration on page 2977.

To-day, neon is used in advertising signs, airport beacons, and in television receivers. So intense is the light from a neon tube that it can be seen in daylight as well as at night. The usual colour is a bright scarlet, but by the addition of a few drops of mercury to the gas the light becomes a brilliant blue. Other colours are produced by tinting the glass tubes which contain the neon gas, and by other patented processes.

Neon lamps are made by confining the gas in a glass tube from which the air has been exhausted. When an electric current is passed through it, the tube glows with a brilliant fiery-red tint. There is no filament in the tube, but there are two electrodes. Between these the gas forms a luminous band.

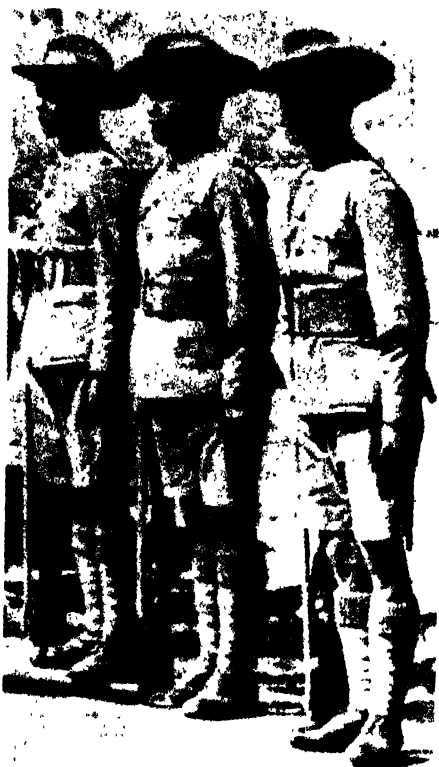
The gas is made by chilling air to a point far below zero, and catching the neon as it evaporates.

NEOPHYTE, *ne' o fite*. A term from a Greek word meaning "newly-planted," which is applied in the Church to the beginners in a religious order, or to those converted from heathenism, who have recently been baptized, and so newly planted into the Church.

NEOPTOLEMUS, *ne op tol' e mus*. See PRIAM.

NEPAL, *ne pawl'*. Independent kingdom in Northern India, on the southern slope of the Himalaya Mountains, lying south of Tibet and north of British India. Its area is about 54,000 sq. miles, and the population 5,500,000. The northern part of the country is mountainous and contains some of the highest peaks in the world, among them Mounts Everest and Dhaulagiri (26,826 ft.—long thought to be the loftiest of the Himalayas). The southern part is a broad, fertile plain, watered by several rivers.

Among the mountain ranges of the north, the hillsides are terraced, and the mountain streams have been utilized for irrigation; in



GURKHA SOLDIERS

Photo Central

this region the hardier crops are grown, such as barley, wheat, buckwheat, and legumes. Though pastures are scarce, the few sheep raised are noted for their fine wool. There are deposits of iron, lignite, copper, lead and zinc; these, however, are little worked. The great forests on the mountain sides are another almost untouched source of wealth. In the cities of the lowland, chief among which are Katmandu (the capital), Patan and Bhatgaon, coarse cotton cloth, bells and other metal ware, pottery, and a very strong, heavy paper are manufactured.

Only a small portion of Nepal is ever visited by Europeans, and then it is entered only by special permission of the Nepalese Government. The entrance is by way of the Valley of Katmandu. In 1927 a railway was opened between Raxaul, in India, and Amlekhganj, near Katmandu.

Before the fourteenth century, Nepal was inhabited mostly by scattered tribes of



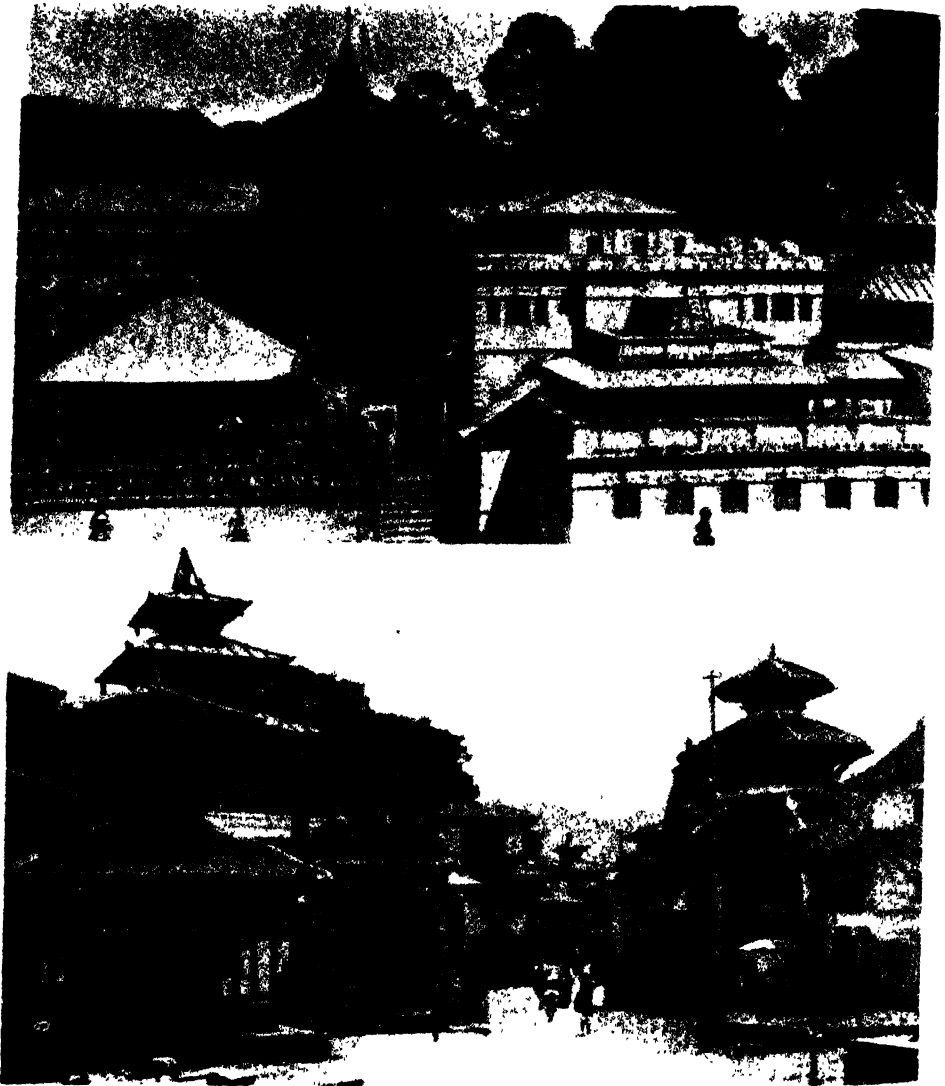
NEPAL

1. Stone temple of the Lord Krishna at Patan. 2. Carved stonework over the entrance to the temple of the goddess Bahahi at Bhagatpur. 3. Countryside outside Katmandu. 4. A god, Nela Kantha, reclining on a bed of serpents in pool, near Katmandu. 5. Arya Ghat River and temples of Shiva (Shivalayas) at Pashupati. 6. Rani Pokhari and Durbar School, with temple in centre of lake, Katmandu.

Courtesy: Nepalese Legation

Chinese origin, but in the course of that century, the Hindus began coming in from the south. They settled in the fertile lowlands,

country and settled there late in the eighteenth century. They are a military people, who, since their war with the British in 1814,



NEPALESE TEMPLES

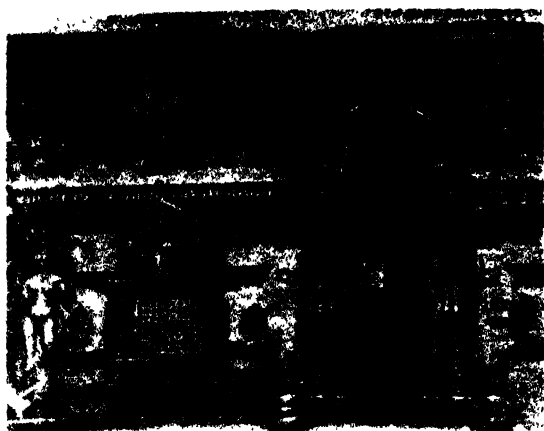
Top: Golden temple at Pashupati. *Bottom:* Street in Katmandu, showing temples and (centre) statue of the god Kala Bhairab.

Courtesy: Nepalese Legation

inter-married with the natives, founded cities, built temples, developed agriculture, and organized many petty kingdoms. They came to be called *Nepars*, and their country *Nepal*.

The ruling class consists of a Hindu race known as the Gurkhas, who invaded the

have remained on friendly terms with Great Britain. Slavery was abolished in 1924. By treaty in 1923, Nepal was recognized by Great Britain as completely independent, though a British Envoy resides at Katmandu. The government is that of a



GOLDEN GATE OF NOOLCHOKE TEMPLE, PATAN
The stonework is elaborately and beautifully carved
Courtesy, Nepalese Legation

military oligarchy, and the ruling power is vested in a Prime Minister, who is assisted by a council selected by himself.

NEPENTHE. A legendary drug possessing the power to produce forgetfulness of things unpleasant; it is identified with opium.

NEPELE, nef' e le. A goddess. See HELLESPOINT.

NEPHRITE, nef' rite. See JADE.

NEPHRITIS, nef' ri' tis. The general name for inflammation of the kidneys. A common form of nephritis is *Bright's disease* (which see). A serious complication of nephritis is poisoning from the waste material which the kidneys have failed to carry off; this malady is known as *uraemia*, or *uraemic poisoning*. Nephritis may be either the result or the cause of heart disease. See KIDNEYS.

NEPOS, CORNELIUS. A Roman historian of the first century B.C. He was probably born at Verona and was a friend of Cicero and Catullus. Only one of his works survives, which gives a series of biographies, twenty-five in number, of illustrious men of various nations.

NEPOTISM, nep' o tiz'm. During the Middle Ages and later, it was the practice of certain Popes to appoint their nephews and other relatives to lucrative positions of importance. Hence the word *nepotism*, from the Latin *nepos*, "a nephew," was coined to describe this practice. Pope Alexander VII, a great enemy of nepotism, said that the Barberini family, relatives of Urban VIII (1623-1644), had alone burdened the Papacy with charges to the amount of nearly one-fourth of its income.

The term *nepotism* is applied to-day to similar practices in the political and business worlds.

NEPTUNE. A planet that is never visible to the naked eye. It was thought to be the outermost planet of the solar system until Pluto was discovered (1930). Its discovery, in 1846, was brought about by the study of the motion of the planet Uranus, which showed deviations from its orbit that led astronomers to believe it was being acted upon by some unknown body. Two astronomers, Leverrier and Adams, were able by deduction and mathematical calculation to determine what body could produce the variations noticed, and where that body was to be found. These calculations were triumphantly verified by the discovery of a planet in the position indicated. Soon afterward it was found that the planet has one moon, revolving around it from east to west.

Neptune is at an average distance of 2,800,000,000 miles from the sun. Its diameter is about 31,000 miles, or some four times the diameter of the earth. It is surpassed in size by Saturn and Jupiter, and possibly by Uranus. Its density is about the same as that of Jupiter. The planet completes its journey round the sun in 164 years, travelling in its orbit at the rate of about three and one-half miles per second. Through a telescope, Neptune appears to have a disk of a greenish colour. Its mass is about seventeen times that of the earth, and its *albedo*, or reflecting power, is a little



TEMPLE TO POSEIDON (NEPTUNE)
Remains of a temple raised by the Greeks at
Sunium, the southernmost point of Attica.
— OROG

less than that of Venus. Spectroscopic observations indicate that its rotation on its axis is direct, with a period of approximately sixteen hours. See ASTRONOMY; SOLAR SYSTEM.

NEPTUNE. Roman deity, identified with the Greek god Poseidon. Neptune was the brother of Jupiter, and second only to him



NEPTUNE

Photo: Visual Education Service

in authority. When the universe was divided, Neptune received the seas, the rivers and the fountains.

Neptune was especially worshipped by sailors and those who had to do with horses. In Greece games were celebrated in honour of the most important being the Isthmian Games, Poseidon, held every four years at Corinth. In art, Neptune is shown with a three-pronged spear, or trident, in his hand, his special symbol. He is usually drawn through the water by dolphins, accompanied by his son. See ISTHMIAN GAMES.

NEERBUDDA, OR NARBADA, *ner bud' a*, **RIVER.** A sacred river of India. Along its entire course of 800 miles are places of pilgrimage. It rises in the Maikal Range, in the northern part of the Central Provinces, and empties into the Gulf of Cambay through an estuary which begins 200 miles north of

Bombay. Its general direction is westerly. Large vessels can sail up the river eighty-two miles from the mouth in the rainy season, and when the tides are favourable, sea-going ships can ascend the estuary as far as Broach, thirty miles from the sea. Jubbulpore is on its banks.

NEREIDS, ne' re idz. In Greek mythology,



NEREID RIDING SEA HORSE

Statue in National Museum, Naples

Photo: Anderson

the fifty daughters of Nereus and Doris. The Nereids were sea nymphs, attendants of Poseidon, who had a Nereid wife, Amphitrite. Thetis, mother of Achilles, was one of the Nereids. See NEREUS; NYMPHS.

NEREUS, ne' re us. In Greek mythology, a minor deity of the sea, his wife was Doris, daughter of Oceanus. He was famous as father of the fifty Nereids, and was often called "the old man of the sea." He alone knew the way to the Garden of the Hesperides, which contained the twelve golden apples that Hercules was ordered to seize. In Hercules' hands, Nereus turned from fire to lion, from lion to water, from water to smoke, until, exhausted, he directed the victorious Heracles on his journey.

NERI, SAINT PHILIP (1515-95). Founder of the Congregation of the Oratory, he was born of a Florentine family. He devoted himself in Rome to religious and charitable works, more particularly among pilgrims, and in 1558 built an oratory in connection with the Church of St. Jerome. Attached to this was an order of priests, without vows, but conforming to a rule of life. They gave addresses in the oratory, led the devotions and provided attractive music which eventu-

ally gave rise to the "oratorio." The Congregation of the Oratory spread to other countries. Saint Philip was interested in England, but it was not until 1847 that an Oratory of his order was founded in this country at Maryvale, near Birmingham, by Cardinal Newman.

NERO (A.D. 37-68). Fourteen years an Emperor of Rome. He was born at Antium, the son of Gnaeus Domitius Ahenobarbus and Agrippina the younger, daughter of Germanicus Caesar. The boy's name originally was Lucius Domitius Ahenobarbus, but after his mother's marriage to the Emperor



A bust from Athens.
Photo. Mansell

and his adoption by his stepfather in the year 50, his name was changed to **NERO CLAUDIUS CAESAR DRUSUS GERMANICUS**. The adoption was a part of Agrippina's plot to place her own son on the throne, instead of the emperor's son, Britannicus. So well did she plan that when Claudius died of poison

in 54, the Praetorian Guard and the Senate united in acclaiming Nero emperor, and he was received with great enthusiasm by the populace. For a time, Seneca, his tutor, practically directed the government and skilfully held Nero's ambitions in check.

Later, however, Nero's popularity began to wane, partly because he was suspected of engineering the murder of his stepbrother Britannicus, and, in 59, that of his own mother, in order to gain the favour of Poppaea Sabina. This lady he married in 62, after the divorce and death of his wife Octavia, sister of Britannicus. Nero was forced to strong measures in order to preserve his position; suspicion of treason became a certain forerunner of execution. Even Seneca, against whom little proof was advanced, was compelled to commit suicide. The emperor, obsessed by fears for his safety (whether real or imaginary is not clear), plunged into profligacy, and yet continued to win the adulation of some for his achievements as poet, athlete, musician and philosopher. He journeyed through Greece taking part in all the public games and contests, and

granted privileges to the province. This course turned public opinion against him, as it was felt that a public performance of any kind was contrary to the dignity of an Emperor.

Rome Burned and Rebuilt. In 61 occurred the insurrection in Britain under Boadicea, and in 64 the great fire took place in Rome. For six days the conflagration raged, and two-thirds of the city was destroyed. Nero maintained absolute calm throughout the disaster, and is said to have recited verses about the burning of Troy while he gazed at the blazing city. Inevitably he was suspected of being the incendiary, but there is no definite evidence of this. The blame was laid upon the Christians, who were persecuted in all parts of the empire. The emperor rebuilt the city on a far more magnificent scale than before, constructing a magnificent palace called the Golden House.

In the year 68, the legions in Spain revolted, declaring their leader, Galba, emperor, and the insurrection spread to the Praetorian Guard. Nero fled, but was overtaken, and committed suicide. Indignation at the events of the closing years of his reign was so great that his name was erased from records and monuments, his palace was torn down, and his statues were broken. Despite all this, and partly because of it, no one of the emperors has been more vividly remembered. Historians of his time stressed the least praiseworthy of his actions and neglected what might have been placed to his credit.

NERVA, MARCUS COCCURIUS (A.D. 32-98). Thirteenth Roman emperor, successor of Domitian. He served as consul in the reigns of Vespasian and Domitian, and in 96, on the death of Domitian, was elected emperor by the Senate with the approval of the people and soldiers. His predecessor had left many abuses which needed reforming, and Nerva proved a beneficent ruler, reducing taxes, placing justice within the reach of all, and recalling exiles. He attempted agricultural reforms and bought up large tracts of land which were to be allotted to poor citizens, and his social reforms included the maintenance of poor children in Italian towns at public cost.

His age made the government a burden, but, though his life had been blameless, he feared to lay aside his power, for his life was threatened. He therefore adopted as his son and colleague M. Ulpius Trajanus (Trajan), commander of the legions in Germany, who succeeded him. Nerva was deified by the Senate after his death.

NERVES. The many organs of the nervous system which carry impulses from the brain and other nerve centres to all parts of the

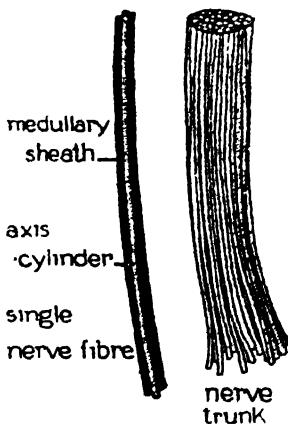


NERVA
Statue in Vatican Museum.
Photo: Mansell

body, and from various parts of the body to the nerve centres. Nerves conveying impulses to the nerve centres are called *sensory* or *afferent* nerves, and those conveying impulses from the centres to various parts of the body, *motor* or *efferent* nerves. See NERVOUS SYSTEM, below.

NERVOUS SYSTEM. If, by chance, your hand touches a hot object, you instantly withdraw it. If the point of the finest needle pricks through the skin, you sense the pain and note mentally the situation of the injury. If a friend calls to you from across the street,

you respond. When you run, your heart beats faster, and you breathe more quickly and deeply. Under all conditions, your body adapts itself to its surroundings, and the organism which enables it to do this is the nervous system. In the lower animals, the nervous system is very



A NERVE
Very highly magnified.

simple, but as we pass from these to the higher forms of animal life, we find the nervous system becoming more and more complex, until in man it reaches its highest development.

The nervous system is often likened to a great telephone network, the brain acting as central exchange, and parts of the spinal cord as local exchanges. The nerves carry impressions (messages) from all parts of the body to the brain, and the brain sends impulses (commands) to all parts of the body; hence this comparison gives a very good idea of how our nervous system acts.

The nervous system is generally divided into three systems; these are the *central*, or *cerebro-spinal*, nervous system; the *peripheral* nervous system; and the *sympathetic* system. The central nervous system consists of the brain and the spinal cord. The peripheral is made up of the nerves that branch off from the brain and spinal cord, and so connect the central system with all parts of the body. The sympathetic system is made up of very delicate nerves that also branch



NEURONE FROM THE OPTIC LOBE
Greatly magnified.

off from the spinal cord, but differing from the peripheral nerves in that they go only to special parts of the body—the heart muscles, glands, and the muscles that we cannot control voluntarily, such as those of the stomach. To understand how the nervous system does its work, we must know something of its structure.

Structure of Nerve Tissue. Nervous tissue under the microscope is seen to be made up of cells, just as is every other tissue of the

body. But nerve cells have a structure peculiar to themselves. Each nerve cell is known as a *neurone*, and consists of a central cell body with a nucleus, and a number of fine thread-like structures. All of these "threads" end in many fine branches, but one "thread" is very much larger than the others. The long one is known as the *axon*, and the shorter ones as *dendrites*. These three elements, then, make up the neurone—axon, cell body and dendrites. The neurone is the unit of nervous tissue; that is, it is the neurone that actually does the work of the nervous system. But, because each neurone is microscopic in structure, so that they may do all the work that is necessary there must be millions of neurones.

In order to work together effectively, these neurones must be connected with one another. This is accomplished by having the fine tuft-like branches at the end of each axon come into close association with the branches at the end of a dendrite of another neurone. These branches never actually grow together, but simply come in close contact with one another. Such a contact between neurones is called a *synapse*. To understand why the axon of one neurone is always connected with a dendrite of another cell, one must remember that what the neurone is doing is transmitting nervous impulses, just as an electric wire transmits electricity. These impulses are always travelling in a definite direction. Therefore it is necessary for the dendrite to receive the impulse, and the function of the axon is to pass it on across the synapse to the dendrite of the next neurone, so that the impulse may reach its destination. It is believed that, when an impulse once travels in this way, a "pathway" for the impulse is made, so that, when that same impulse again enters, its passage over the same route will be much easier. The complicated character of the axons and dendrites makes possible a great variety of interconnection between the elements of the nervous system. Thus behaviour and experience can be infinitely varied.

Peripheral Nervous System. It has been said that the neurone is the smallest part, or unit, of the nervous system. The next division may be said to be a nerve. A nerve may be a single neurone, or it may be a series of neurones, all connected with the central nervous system. The nerves, then, are the larger branches which connect the central nervous system with the rest of the body, and they are made up of the smaller units, the neurones. Several nerves may be grouped together to form a *nerve trunk*. Enlargements upon a nerve, constituting centres of nervous action, are called *ganglions*.

Certain nerves carry impulses from all portions of the body to the central nervous system. These are called *sensory* nerves. These nerves originate in what are known as *end organs* or sense organs. These end organs are sensitive to special kinds of stimulation. Thus our ears and eyes are types of end organs, while there are also special end organs in our skin, some of which give sensations of touch, while others enable us to feel heat and cold and pain.

It is not until the impulse set up by stimulation of a sense organ has reached the brain that sensation is experienced. The adjustment of the body, and actions of all kinds, are made possible through the impulses that travel from the brain and spinal cord along motor nerves to muscles and glands. Within the central nervous system itself there are innumerable and elaborate connections between sensory and motor elements.

We have seen, then, that all nerves are either sensory or motor, according to the direction in which the impulse they carry is travelling. In addition, nerves are called *cranial* or *spinal*, depending upon whether they come off from the brain or the spinal cord. There are twelve pairs of cranial nerves. Such important special functions as sight, smell, taste, hearing, and movement of the eyes and tongue are among those taken care of through the cranial nerves. Thirty-one pairs of spinal nerves come off from the length of the spinal cord and, through their branchings, reach all parts of the body not taken care of by either the cranial or the sympathetic nerves.

The Sympathetic System. The sympathetic system is also made up of nerves which come from the spinal cord, but they have a special course and method of branching which distinguish them from the peripheral nerves. We have spoken of their distribution, which is distinctive, and of the fact that they carry impulses to and from organs over which we have no control, and of which we are not normally conscious. Thus we cannot regulate at will the rate of our heart beat, nor the size of the pupil of the eye, nor the movements of the stomach. Nor are we conscious of whether the pupil is larger, or whether the stomach is contracting normally.

The Central Nervous System. The final and most important division of the nervous system is the central, or cerebro-spinal, system. This, as has been said, consists of the brain and spinal cord.

The spinal cord has its origin in the brain and runs the whole length of the trunk, being well protected by fluids and membranes surrounding it and by the spinal column, in which it is enclosed. Examination

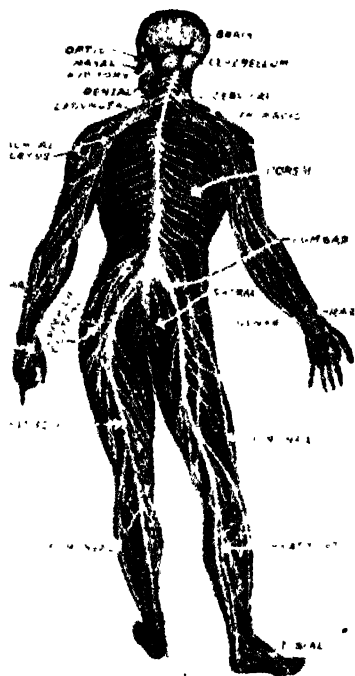
shows that it consists of an outer white part and an inner grey part. The white part is made up of bundles of nerve-fibres (the axons of neurones), which are concerned with conveying impulses from one level of the cord to another and to and from the brain. The grey matter contains the cell-bodies of

under normal circumstances, the brain exerts a controlling or inhibiting action upon them.

The brain itself is protected by the skull, enveloping membranes, and fluids, and has a very liberal blood supply. The grey matter containing cell-bodies, largely forms the outer part or cortex of the brain. In the inner part is much white matter, containing the nerve fibres that connect the cortex with the spinal cord. The outer surface of the brain is formed into innumerable folds or convolutions. Thus its surface is very large for its whole bulk. As we pass from the lower to the higher animals we find not only that the brain becomes larger, but that there is a great increase in the convolutions and thus in the surface area.

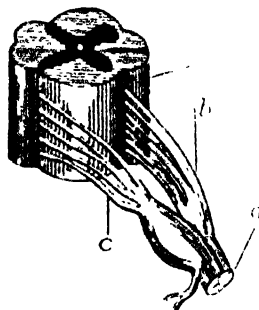
A certain amount is known of the functions of the various parts of the brain. The middle and lower parts, which in the course of evolution are the oldest, seem to be concerned with the pleasantness and unpleasantness of experience and with the more instinctive drives towards action. The *cerebellum*, which forms the lower back part of the brain, is concerned with locomotion, balance, and poise. Injuries to this part of the brain lead to marked disturbances of those functions. The whole of the upper part of the brain (developing rather late in the course of evolution) is made up of the two cerebral hemispheres, and it is upon the proper functioning of the cortex of these that all our sensation, voluntary movement, perception, and thought depend. We know that the right hemisphere is mainly concerned with impulses to and from the left side of the body; the left hemisphere with those of the right side. Thus we may find that damage to one hemisphere leads to disturbance on the opposite side of the body. In the cortex of the cerebral hemispheres a number of areas have been mapped out which are connected with special functions. At the back of each hemisphere

is the area for vision. There is a special area for hearing in a part lying beneath the temples; there are areas for smell at the base of the brain, and so on for the other senses. Besides these sensory areas, there are motor



NERVOUS SYSTEM
General outline of main divisions

neurones which are responsible for the life and nourishment of the neurone cells. Within the spinal cord itself, connections are made between sensory and motor neurones. At the same time, connections are made with the higher centres and the brain. Many reflexes take place through the nervous connections in the spinal cord. Sometimes the brain is also involved in these reflexes, so that we become conscious of them and control them to some extent. Many people will have had the experience of seeing an eel wriggle after its head has been removed, or a bird flutter after its neck has been wrung. These actions are spinal reflexes and, obviously, in the cases cited, the brain has nothing to do with them. It can be shown experimentally, however, that spinal reflexes are more exaggerated when the brain is put out of action, so that we may take it that,



SPINAL CORD
A section of the spinal cord
(a), showing sensory nerve
(b), motor nerve (c), and
nerve trunk (d)

areas governing voluntary movement in the different parts of the body.

Scientists have mapped all these areas fairly accurately, partly by the localization of brain injuries producing defect of various function, and partly by experiment. It has been found possible to produce movement in animals by artificial stimulation of the cortex. Similarly, by careful operations, surgeons have traced the effects of removing parts of the brain upon sensory and motor functions and upon learning ability. The knowledge thus gained has been of invaluable service to medicine.

Besides the sensory and motor areas of the cortex, there are large areas where the neurones apparently do the work of connecting up the various centres with one another in an infinite variety of ways—a variety which is understandable when we consider the wealth and complexity of the experience, thought, and behaviour which depend upon the functioning of the brain. See also related articles: **BRAIN**; **NERVES**; **SPINAL CORD**; **SYPATHETIC NERVOUS SYSTEM**.

NESS, LOCH. See **SCOTLAND**, **INVERNESS-SHIRE**.

NESSUS. See **HERCULES**.

NESTOR. A Greek hero, the son of Neleus and Chloris, king and queen of Pylos in Messenia. While Nestor was away on a visit to Gerema, Heracles killed his father and brothers, because Neleus refused to purify

him after the murder of Iphitus. Nestor became a great warrior, and, it is said, took part in the battle between the Centaurs and the Lapithae. During the Trojan War, he was one of the Greek council.

NESTORIANS. The followers of Nestorius, Bishop of Constantinople (A.D. 428–431), who held that in Christ there were not only two natures but two persons. Nestorius denied the theory of Incarnation as generally accepted by the Church, contending that it was impossible for God to be born of a human being. Nestorius was a native of Germanicia, in Syria, and as a monk was famous for his eloquent preaching. Cyril, Bishop of Alexandria, took exception to the teaching of Nestorius, and at the Council of Ephesus in 431, the latter was condemned. Nestorius declined to attend the Council and was deposed from his bishopric and ultimately banished. Doctrines similar to those of Nestorius are still taught in the East Syrian Church.

NESTS. A structure built, usually by a bird or insect, for the protection and rearing of its young. An account of the main types of birds' nests is given under the heading **BIRD** (which see). The materials used and the sites chosen by birds vary enormously, not only in different species but in individuals. Thus, bush-nesting species such as thrushes may nest in outbuildings, and water-birds, such as ducks, have been known to rear a brood in a church tower; while there



NESTOR HEALING MACHAON
Carving in the British Museum.

Photo: Mansell



PEEWIT'S NEST
Photo: E. J. Hosking



CHIFFCHAFF'S NEST
Photo: John Kearnson



OYSTER-CATCHER'S NEST
Photo: E. J. Hosking



GREAT TIT'S NEST MADE UNDER THE FLOWER-POT
Photo: John Kearnson

have been instances of London pigeons making their nests of hairpins, and of stone-curlews lining their scraped hollow in the ground with rabbit-droppings.

Both parents may build the nest, and the birds of prey regularly bring new green

branches to the nest long after the young have hatched. In the wren, the cock bird builds nests of its own, which are never completed and are usually quite devoid of lining; at times these nests are used for roosts by the parents and family. The

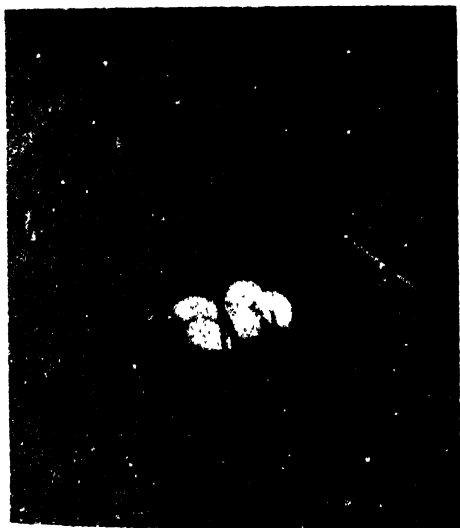


DABCHICK'S NEST

When seeking food, the dabchick covers her nest to keep the eggs warm and to conceal them. The covered nest might easily be mistaken for rotting vegetation.

Photo: L. J. Hosking

long-tailed tit is our finest British nest-builder; its neat, domed structure of moss is covered with grey lichens, and lined, perhaps, with as many as two thousand feathers.



NEST AND EGGS OF THE MARSH HAWK

Photo: Keystone

In the insects we can trace a complete series of nesting habits, from the social wasps, bees, and ants, to sub-social forms which nest in colonies, and thence to solitary species, in which each individual makes its own burrow, provisioning it with food for the larvae.

Some mammals, such as squirrels, mice, and moles, also make nests, used both for breeding and for hibernation, and placed usually in trees or underground. And there are a number of nest-building fish, such as the sticklebacks, in which the males mount guard over the nest until the young have hatched.

NET. The name of a fabric with an open



NET-MAKING

Photo: Central

weave, made of the various threads of textiles and wire. The spaces between the threads are called the meshes, and the threads are knotted at the intersections, to keep the meshes uniform in size. Net fabrics are used for catching fish, animals and insects; they serve for hammocks, screens,



JAPANESE CASTING-NET

The net, which is fastened to one wrist, calls for great skill in casting

Photo: Top

and various domestic purposes, as a part of the equipment for tennis and other games. Wire netting is extensively used for fences.

The principal kinds employed for fishing are the *seine*, *drift*, and *trawl*, the *kettle* or *weir*, and the *trammel* nets. The *seine* is very long in proportion to its width, and has a line of corks along one of its long ends and a line of leaden weights on the other, so that it becomes a perpendicular sheet when thrown into the water. It is used near the shore. The *drift* net has the same proportions of length and breadth, but is not loaded with lead, and floats in the water. The *trawl* is a huge pocket, and is dragged along the bottom by the boat. *Kettle* or *weir* nets, structures fixed on stakes, are placed along the coast between high and low water. *Trammel* or *set* nets are also fixed between stakes, and consist of a set of three nets attached at top, bottom, and sides, the outer ones being of coarse net and taut, and the middle being slack and of fine mesh. The whole system of nets hangs vertical. The fish passes easily through the coarse mesh, and in forcing its way through the fine mesh, finds itself caught in a pocket from which it cannot escape.

NETBALL. An outdoor game for girls, usually played by two teams of seven on each side. The goals are normally 100 ft. apart, consisting of a net fastened to an iron ring, 15 in. in diameter, projecting 6 in. from an upright post. The net should be 15 ft. above ground for girls of average height. The ball is 27 in. in circumference. The girls are placed in definite positions, and after the ball has been "bounced" in the centre of the field, which should be about 50 ft. wide,

it is thrown from girl to girl until it reaches the player stationed near the goal, when she attempts to throw the ball into the net. Opponents try to intercept the ball as it is being passed from player to player.

NETHERLANDS, THE, OR HOLLAND with an area of 13,214 sq. miles, it is one of the smallest states in Europe, but has the



NETBALL MATCH

Photo: Topical

third largest empire in the modern world, having an area of 788,000 sq. miles equal to one-fifth of all Europe.

The colonial possessions include Dutch Guiana, on the north coast of South America, Curaçao, in the West Indies; and numerous islands of the Malay Archipelago, of which the Netherland East Indies comprise an area of 733,296 sq. miles, with a population of 60,380,025.

People. The inhabitants, who number



QUEEN OF HOLLAND AND PRINCE CONSORT
Queen Wilhelmina, in state dress, and Prince
Henry Frederik (d. 1934) in uniform of a
Lieutenant-General.

Photo: U. & U.

8,290,389, call themselves *Nederlanders*, for the word *Dutch* is merely a corruption of *Deutsch*, meaning German. Of Nordic and Alpine race, they exhibit distinctive characteristics of enterprise, thrift and trading capacity, qualities born of the nature of the land and its favoured position for commerce by land and sea.

The level nature of the country makes bicycling a popular mode of travel; there are 1,500,000 bicycles in the country, and nearly 47,000 motor-cycles.

CITIES AND TOWNS

Crowded into the small area of Holland there are forty-nine towns and cities, each with a population exceeding 20,000.

Amsterdam, Holland's largest city, The Hague, the capital and seat of the Hague Tribunal, and Rotterdam, the greatest seaport, are described in separate articles. Other cities of note are the following:—

Arnhem, or **Arnhem**, on the Rhine, with ramparts surrounding the older portion of the city, was the *Arenacum* of the Romans.

The manufactures consist of wagons, furniture, mirrors, and scientific instruments. During the Middle Ages, Arnhem was a member of the Hanseatic League (which see). Its population is 82,367.

Delft, a picturesque town near Rotterdam, founded in the eleventh century, is intersected by numerous tree-bordered canals, crossed by sixty-nine bridges.

The town was at one time famous for the manufacture of a beautiful pottery, the appearance of which, about 1600, marked an epoch in the art of ceramics. The industry, which suffered a severe decline in the latter part of the eighteenth century, has been revived. Population, 52,153.

Groningen, one of the most important commercial centres, lies 22 miles inland from the Dollart Inlet, with which it is connected by canal. The city is crossed by numerous canals and has extensive docks. There are manufactures of textiles, sugar, furniture, cigars and tobacco, timber, machinery, and gold and silver ware. Groningen was an important member of the Hanseatic League as early as 1282. Population, 111,240.

Haarlem lies 11 miles west of Amsterdam, in the heart of the tulip country. Coster, for whom is claimed the invention of printing, was born in the city. One of its oldest and most extensive industries is the cultivation of flowering bulbs and tubers, which are shipped to all parts of the world. Population, 126,740.

Leyden, or **Leiden**, on the Old Rhine, and 22 miles south-west of Amsterdam, is a typical Dutch town, with wide streets and many canals bordered by avenues of trees. The city manufactures cloth, cotton and twine, and is the seat of what was formerly one of the most celebrated universities in Europe, founded by William of Orange in 1575. Population, 72,414.

Utrecht is 22 miles south-east of Amsterdam, on the Old Rhine. Much of the history of Holland centres upon this interesting old city. In 1579 there was formed here the union of the seven Protestant provinces out of which grew the nation of the Netherlands. The university was founded in 1636.

Industries include sawmills, machineries, breweries, carpet works, velvets, cottons, linens and musical instruments. Population, 159,895.



PEOPLE OF THE NETHERLANDS

Left: Milkmaids in the Isle of Walcheren Right: Fisherman of Volendam

Photos OROC

Religion and Education. The Netherlands may be regarded as a Protestant state, though the provinces of Limburg and Brabant are preponderantly Roman Catholic. The Protestants still constitute nearly half of the Church membership, and over half of them are members of the Dutch Reformed Church. Holland has long been noted for its toleration of religions. The Jews, however, of whom there are over 110,000, have been permitted freedom of worship only since 1847.

Education from 6 to 13 has been compulsory since 1900, and there is practically no illiteracy. Private schools, if approved as efficient, are recognized. Secondary education is given in both public and private schools. There are also many technical schools. Five universities—Leyden, Utrecht, Groningen and Amsterdam—were established in the early modern period.

Language and Culture. Most of the Netherlands speak Dutch, which is a near relative of *Platdeutsch*, or Low German. Dutch,

however, is not a German dialect. Dutch and German are equally old and derived from the same source, the Gothic.

National fame in art, and to a lesser degree in music, have accompanied each other in Holland. Although the Dutch have not produced as many noted composers as other countries, they founded the modern school of music, and in the fifteenth and sixteenth centuries their composers were well known. The earliest college of music in Naples was founded by Dutch musicians. Five hundred years ago they invented the canon and madrigal, and perfected counterpoint. The Netherlands has given the world some of its greatest painters—Rembrandt, Frans Hals, Jan Steen, Van der Meer or Vermeer of Delft, and others.

The Country and its Climate. Except for Limburg in the south-east, where light sandy soils rise in one place to a height of over 1000 ft., and the infertile moors of the north-east, Holland is a land of low plains of clay and loam. Part of the kingdom is below the

level of the sea, which is kept back by the famous dikes (*dijken*), and the mean level of the whole country is only about 30 ft higher.

Three great streams, the Rhine, the Meuse (here called Maas) and the Scheldt, have built up a large part of the country. Other parts have been reclaimed from the ocean, especially on the shores of the Zuider Zee. In a great land-reclamation project, a huge dike, 18 miles long, which shuts out the sea from what is now the Zuider Zee, was completed in 1932, and the work of pumping the water out was started. The reclaimed area will embrace about 550,000 acres, and it is hoped to complete the work by 1950. The River IJssel, which now flows into the Zuider Zee, will flow into a huge fresh-water reservoir, Lake IJssel, in the centre of the country. The immense cost of this project—more than £50,000,000—will be offset, it is estimated, by the value of the additional "polders" of farming land and the fresh water to be used in the periods of drought.

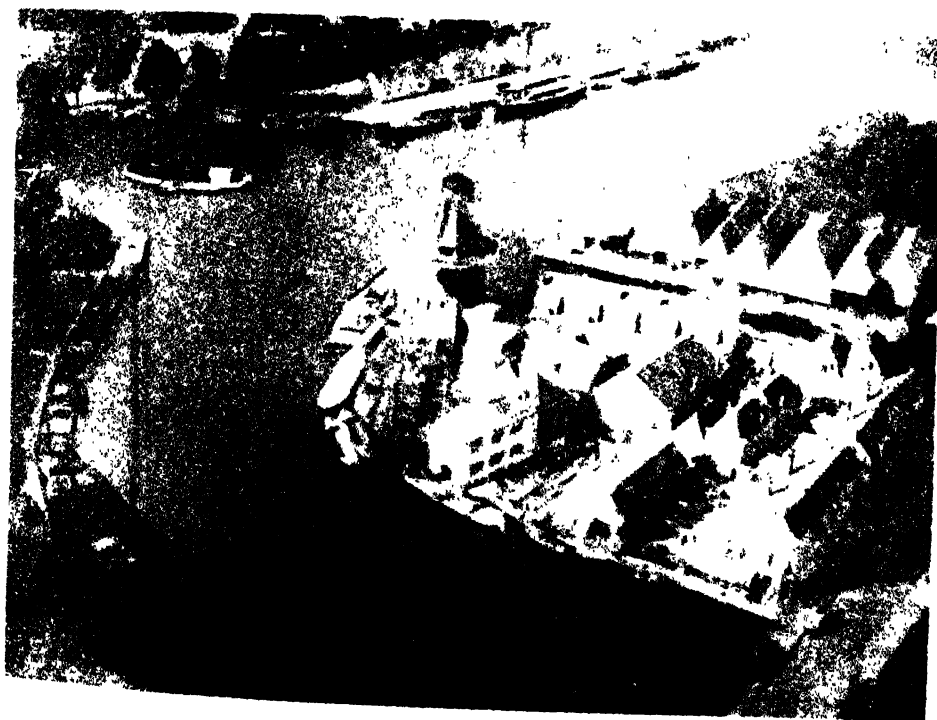
As is always the case in deltaic land, there are many islands along the coast. Sand dunes protect most of the shores, and between them are built the dikes, huge bar-

riers of earth and stone. The climate is cold and harsh in winter, but warm in summer. Rain is normally plentiful.

Occupations. *Farming.* Holland is primarily an agricultural country. Garden vegetables are raised for export, and also great crops of potatoes, rye, oats, wheat, sugar-beets and flax. Rye and oats are grown for home markets. About 60 per cent of the entire area is cultivable.

The sandy soil behind the dunes of the south-west coast is utilized for the growing of hyacinth, tulip, and other bulbs for export to every part of the world.

Dairying. Actually, one-fourth of the land lies below sea level, but the Dutch have encircled these areas with dikes, and keep them drained by canals, into which the water is pumped by windmills. The *polders* are sometimes as low as 18 ft. below sea level. On the posts surrounding them, storks build their nests. These birds feed upon the frogs and toads that threaten the crops. The rich meadows of these polders provide pasture for millions of cattle. Hence the dairying industry is of great importance; enormous quantities of butter, cheese and condensed milk are manufactured and exported



HAARLEM

The mill, an ancient one, is known as "Adriaan."

Photo: K.I.M., ORO

chiefly to Great Britain, Germany and America. Holland is also famous for its cheeses.

Fisheries. The villages of the coast, particularly of the Zuider Zee, are chiefly engaged in the fishing industry. Oysters and small fish are found in these waters, but many of the 25,000 fishermen are busy from May to November in the herring fisheries of the North Sea.

Minerals. Since over 90 per cent of the

Netherlands are famous. These are the manufacture of pottery at Delft, and the cutting of diamonds at Amsterdam.

Commerce. Trade and commerce rank next to agriculture in the number of people they engage. Besides shipment of farm products to the neighbouring countries of Europe, a vast trade is carried on in connection with Java, Sumatra and the other Dutch possessions. Cocoa, coffee, tobacco, sugar, tea, spices and other products of the



LANDSCAPE IN THE POLDERS

Photo: OROC

country is built of sand, clay, and mud brought down by the rivers or washed up by the sea, Holland naturally lacks minerals. A few coalfields exist in the province of Limburg, the most southerly and inland section of the country, but the output is not sufficient for domestic needs. Peat is dug in the great areas of bog and moor along the north-east border.

Manufacturing. Shipbuilding, sugar-refining, distilling, and the manufacture of cigars, chocolate and margarine form the most important industries. Many of the manufacturing industries of the country depend upon trade with its colonial possessions.

Two at least of the industries of the

Indies are imported in a raw state and prepared for export. The importance of Rotterdam as a port is increased by its connection with the Rhine; thousands of tons of goods for Germany, Switzerland and Austria are carried up the river in Dutch boats.

Great Britain and Germany consume the majority of Holland's exports and furnish most of the imports, consisting of iron and steel goods, textiles, coal, cereals and flour.

Rivers, Canals and Railways. There are a little over 2200 miles of railway, and many canals, which, with the rivers, form a network of about 4660 miles of waterways. Many villages are miniatures of Venice, and even

in the larger cities much of the transport is by boat.

Soon after it enters Holland, the Old Rhine (Neder Rijn) leaves the River Waal, which is joined some miles farther on by the Maas. Rotterdam lies on one of the channels of the Rhine-Maas-Waal, but in recent times the channel mouth had become so blocked with mud that a deep-water canal, finished in 1890, was constructed to the sea, a distance of 20 miles. Amsterdam formerly was entered from the Zuider Zee, but

Chamber, contains 100 members, elected by the people for four years. The electoral Act of 1917 provides for universal suffrage with regards to both sexes over 25 years of age, and proportional representation.

All national legislation originates in the Lower House, the Upper Chamber lacking even the power to amend the Bills sent to it for approval or rejection.

A Council of State of fourteen members shares with the Sovereign the governing power.



DUTCH FAMILY
Photo: OROC

it, too, has been connected with the North Sea by canal.

Government. Until the French Revolution, Holland was the foremost champion of liberty on the European continent, but having learned under French domination an unpleasant side of republicanism, the Dutch people decided, after the fall of Napoleon, to have a king. The constitution of 1814, with amendments, is still in force. Under it Queen Wilhelmina has executive power and a slight measure of legislative power as well, for acts of the *Staten Generaal*, or Parliament, are submitted to her before being voted on, as well as after. In addition, she may at any time dissolve either or both sections of the States-General. The Upper House of the Parliament, called the *Eerste Kamer*, or First Chamber, corresponds to a Senate. Its fifty members are chosen by the legislatures of the eleven provinces and serve six years. The *Tweede Kamer*, or Second

The executive authority of the sovereign is exercised through a Cabinet of ten Ministers.

Local Government. The legislatures of the provinces control all matters of provincial welfare, but subject to the approval of the Queen. Communities have councils and mayors, subject to the legislatures of the provinces.

Colonial Government. The government of the colonies is administered in each case by a governor and advisory council, appointed by the Sovereign. In Dutch Guiana the natives have their own representative body, and in the East Indies a complex system of local government prevails, by which the native races actually govern themselves.

Literature. Little is known of Netherlands literature before the Middle Ages, although the writings of one man, Heynrik van Veldeken, have come down to us from the late twelfth century. *Van den Vos*

Reinaerde, a story of the adventures of Reynard the Fox, and the miracle play, *Mariken van Nieumeghen*, are perhaps the finest achievements of Dutch literature up to the end of the fifteenth century.

Several important writers belong to the seventeenth century, among whom are Constantijn Huygens (1596-1687), Jacob Cats (1577-1660), G. A. Bredero (1585-1618), and, most important of all, Pieter Hooft (1581-1647), whose rhetorical prose style, modelled on the Latin, strongly influenced his fellow

writers in whose works it is not difficult to trace the influence of English and French romantics. Beets's novel, *Camera Obscura*, is a fine study of Dutch middle-class society.

A movement which gave new life to Dutch literature was signalized by the publication of the review, *De Nieuwe Gids*, in October, 1885. The principal writers belonging to this movement are the poets Willem Kloos and Albert Verwey, and the distinguished novelist Louis Couperus (1863-1923). Of the outstanding Dutch writers of to-day may be



GROUP OF SMALL DUTCH GIRLS IN "SUNDAY BEST"

Photo - Wide World

writers. The famous Renaissance scholar, Desiderius Erasmus, wrote only in Latin.

An uninspired loyalty to classical rules and a slavish imitation of French authors deadened much of Dutch literature in the eighteenth century. But Willem Bilderdijk (1756-1831), who suffered exile as an Orangist, broke away from this subservience to classical forms. He wrote epic as well as lyrical poetry, and gave powerful expression to his religious feelings in poems like *Bebed* (1796) and *Boetgang* (1826).

The Romantic movement troubled the pseudo-classical complacency of Dutch literature in the fourth decade of the nineteenth century. Nicolaas Beets (1814-1903) and Josephus Thym (1820-89) are romantic

mentioned the poets Peter Cornelius Boutens and Martinus Nyhoff, and the prose writers Augusta de Wit and Felix Timmermans.

History. The story of the present kingdom of the Netherlands is bound up with that of Belgium, for during part of their history these two have been united, and until 1830 the term *Netherlands* included both countries. The word *Holland*, on the other hand, formerly referred, not to the nation, but only to the two provinces in it which were once the County of Holland.

In Roman times, the Netherlands were the home of three tribes, the *Belgae*, the *Balavi*, and the *Frisii*, whose names survive in *Belgium*, in *Batavia*, the metropolis of Java, and in *Friesland*, one of the Zuider



PEASANT WOMAN AND CHILD BY A CANAL BANK ON A FARM IN HOLLAND

Zee provinces. Before Charlemagne's day, most of the tribes had been converted to Christianity, and all formed a part of his empire. In the division which followed, the land east of the Scheldt fell to the Middle Kingdom, afterward being alternately under East and West Frankish dominion. Thus it came about that there were three languages in the Netherlands: Walloon French, Dutch, and Flemish, which resembled both.

Under the feudal rule, the quarrels between the numerous petty rulers in the Netherlands made it possible for a number of the towns to obtain practical independence. The men of the south were weavers, but those of the north were fishermen, mariners and traders. In the fifteenth century, several towns jointly fitted up a fleet, which attacked the Hanseatic League and gained freedom for their commerce. Dutch vessels grew in number, and the Dutch merchants became the wealthiest in the world. Their large fleets fought even the king of France. The Netherlands, which at this time included what is now Belgium and Luxembourg together with part of France came under the sway of the Burgundian Dukes at the end of the fourteenth century. Though the country retained great prosperity, many of the cities were forced to surrender many of their privileges.

Spanish Domination. In 1477 the Netherlands forced Mary of Burgundy to sign "The Great Privilege," which left to the sovereign even less power than the Queen has to-day. Charles V, ruler of nearly all Europe, was born in the Netherlands and felt an interest in its people, but his heavy taxes caused revolts in Bruges and Ghent. His son Philip II, a thoroughgoing Spaniard, did his best to stamp out Protestantism with the Inquisition, but under the leadership of William the Silent, the Netherlands drove out the Spanish garrisons.

Though Spain was at this time ruler of over half the world, and the Netherlands was but a tiny corner of it, the conflict between them—which lasted, with slight intervals, from 1567 to 1648—resulted in Spain's financial ruin and Dutch rise to international power. Hitherto the Dutch had been excluded from the Spanish Indies; now they grew rich in its commerce. France and England, enemies of Spain, gave to the Dutch privileges of trade, and Amsterdam became Europe's greatest commercial city.

But this very prosperity prevented the political advancement of the nation. The merchants of the province of Holland opposed the military activities of their *stadtholders*, or state guardians, William the Silent and his successors, because they did not want the rival towns of Flanders, and

Antwerp with its wonderful harbour, included in the nation and sharing their advantages. The Protestants, too, persecuted their Roman Catholic brethren, who predominated in the Belgian Netherlands. In 1648 the United Netherlands signed a treaty of peace with Spain, thus breaking its pledge to its ally, France, and leaving the Belgian Netherlands in Spanish hands. By this treaty the independence of the United Netherlands was recognized, and the River Scheldt was closed to commerce, a step which caused the ruin of Antwerp, Amsterdam's rival.

English and French Wars. 1650 was a turning-point in Dutch history. Twenty years earlier, the office of stadtholder had been made hereditary, but upon the sudden death of William II, who in his two years' rule had thoroughly cowed the merchant politicians of Amsterdam, the governing power fell largely to one Jan De Witt. In his time, the Netherlands fought two naval wars with England, provoked largely by the latter's commercial jealousy. Though the Dutch carried nearly all the world's trade in their merchant ships, their navy was small, and success and failure alternated.

In 1672 Louis XIV of France invaded the Netherlands, and took several towns in rapid succession, for De Witt and his party had disbanded most of the army. But again the House of Orange rescued the nation. Prince William, 21 years old, persuaded the people to open the dikes and flood the land over which the French must advance. The prince later became King William III of England, and during his reign carried on almost constant war with France.

In the succeeding years, Dutch prominence in international affairs declined, and the nation lost some of its colonies and much of its trade. At times the princes of Orange were in power, at other times the burghers. In 1795 came the end of the United Netherlands, for the army of the French Revolutionists, advancing when the country was frozen over, took Amsterdam. The Batavian Republic was organized, which in 1806 gave way to Napoleon's rule. During this period, because of their connection with the French, the Dutch lost some of their colonies, including the Cape of Good Hope to Britain, and witnessed the ruin of their trade.

Independence. When the present kingdom was formed at Napoleon's downfall, a prince of Orange became King William I. The Congress of Vienna, in fixing the new boundaries, included the Austrian Netherlands within them and gave Luxemburg to the same ruler; but in 1830 the former territory revolted and became the kingdom of Belgium, while the latter was taken from the House of Orange when Queen Wilhelmina

came to the throne in 1890, because its law did not then permit a female ruler.

At the beginning of the World War the position of the Netherlands was exceedingly embarrassing. The strictest neutrality was enforced, and Holland sought to meet such demands upon it as were possible without incurring the enmity of other Powers.

Holland is a member of the League of Nations. The "Palace of Peace" at the Hague was completed in 1913.

NETTLE. The common name given to a genus of plants of wide distribution in temperate regions. The characteristic species are annual or perennial herbs, covered with fine, needle-shaped hairs containing a watery juice that produces painful irritation when it enters the skin. The roots of some nettles yield a yellow dye, and the juice is used to colour woollen goods green. Nettle beer is made from the stalks and leaves, and the young shoots are sometimes eaten as a vegetable.

The common *stinging nettle* is a roadside and field weed with a slender stem and crinkled, lance-shaped, opposite leaves.

Scientific Names. The nettle genus is *Urtica*, family *Urticaceae*. The common nettle is *U. gracilis*; the great nettle, *U. dioica*. The dead-nettle is *Lamium album*.

NETTLE-RASH, OR URTICARIA.

A condition of the skin characterized by raised weals of irregular shape, generally between a quarter of an inch and an inch in diameter, whitish in colour, and the seat of intolerable itching. It is caused by poisons either from local contact, as with stinging-nettles, or jelly-fish, or from the food, e.g. shell-fish or indigestible meats. Some people are especially prone to such attacks. To cure them, the cause must be removed, and lead lotions or bicarbonate of soda should be applied.

NETTLE TREE. A North American tree greatly resembling the common elm, and belonging to the same family. The nettle tree grows from 50 to 125 ft. high, sending up a slender trunk covered with rough, brown or pale-grey bark. Its branches are less drooping than those of the elm, and its leaves are smaller and of a brighter green.

Scientific Name. The nettle tree belongs to the family *Ulmaceae*. Its botanical name is *Celtis occidentalis*.

NEUCHÂTEL, *nə shah tel'*. See SWITZERLAND.

NEUCHÂTEL, LAKE. See SWITZERLAND.

NEULLY, *nə' ye*, TREATY OF. See BULGARIA (History).

NEURAL'GIA. Disease marked by pain in one or more of the sensory nerves. Facial neuralgia, the most common form, is known medically as *tic douloureux*. Neuralgia affecting the leg is *sciatica*, and that of the stomach is *gastric neuralgia*. Neuralgia is often confused with neuritis, but the former is a symptom of diseased conditions, and the latter is a disease of the nerves themselves. In neuralgia, paroxysms of severe pain are usual, and the pain may shift from one part



STINGING NETTLE.
Photo: E. J. Hosking



DEAD NETTLE IN FLOWER.
Photo: E. J. Hosking

of the nerve to another. Destruction of the nerve tissue is absent in neuralgia.

Facial neuralgia may be caused by infected eyes, nose or teeth, and in such cases it disappears when the infection is eradicated. Hot applications, electricity, and various drugs are among the temporary remedies for neuralgic pains. Anaemia is a common cause of neuralgia. Exposure to cold and dampness should also be avoided. Neuralgia may be a symptom of several diseases, including gout, rheumatism, and diabetes, and the chief remedy in such cases is treatment of the disorder.

NEURASTHENIA, *nū ras the' nia*. A term for general exhaustion of the nervous system; *nervous prostration* is the popular name for this condition. The disorder is attributed to the strain, pressure and high tension incident to modern life. Neurasthenia has a large number and wide variety of symptoms. Tendency to extreme fatigue on slight exertion, with disinclination to exert oneself either physically or mentally,

is perhaps the outstanding symptom. Poor memory, failure to fix the attention, and inability to concentrate are common evidences of the mental fatigue of the neurasthenic. Headache, backache, indigestion, rapid heart-beat and a feeling of pressure about the head are some of the physical symptoms. In addition, the neurasthenic is apt to sleep poorly, have bad dreams, be given to brooding, and suffer from depression, and he tends to give way to fears of various kinds.

It is generally agreed that neurasthenia is often dependent upon early upbringing. A self-centred person, not self-controlled and poorly trained in youth, gradually evolves into a neurasthenic. Overwork, investigators tell us, does not cause neurasthenia in itself; there must be emotional factors present, and among these, needless worrying is the most common.

Treatment of neurasthenia is twofold—physical and mental. The body must be built up by nourishing food. Bad physical habits must be given up. Then the patient must be trained to change his mental habits. In very serious cases, the education of the neurasthenic is best carried out under the direction of a competent specialist. See NEUROSIS.

NEURITIS, *nū rī' tis*. An inflammation of a nerve, characterized by pain and tenderness along the part affected. Most cases of neuritis are believed to be caused by infection, the source of which may be the roots of the teeth, the tonsils, the intestinal tract, and other parts of the body. Excessive indulgence in alcohol, lead poisoning, arsenic poisoning, and certain diseases are other causes of neuritis.

Long-continued neuritis usually leads to destruction of the nerve trunk and numbness and wasting of the muscles, which result in paralysis. Temporary attacks of this painful malady usually are relieved by rest and hot applications. See HERPES.

NEURONE, *nū' rone*. See NERVOUS SYSTEM.

NEUROPTERA, *nū rop' ter a*. An order of insects whose distinguishing characteristics are their netted-veined wings, biting or piercing mouth parts, and complete metamorphosis from the larval to the adult state. The order contains such insects as alder fly, fish fly, lace-wing fly and ant lion. See INSECT.

NEUROSIS, *nū rō' sis*. When we say that a person is suffering from "nerves," the term corresponds roughly to the medical concept of neurosis, of which neurasthenia is one type. The phrase "nervous breakdown" is sometimes used popularly to describe an acute neurosis. Sometimes it describes cases

of insanity—more especially those which recover; these are termed "mental cases."

Here we are concerned with the neuroses, and a brief indication of the chief forms that occur will best indicate the nature of these troubles. It may be said from the start that in none of these cases is there any actual disease of the nerves. Yet with a perfectly good nervous system the person does not feel and behave in the ordinary way. The neuroses are thus often known as *functional nervous disorders*, as opposed to organic disorder, where there is real damage to the nerves. The neuroses, or functional disorders, are the province of psychological medicine; the organic nervous disorders are cases for the neurologist.

The neuroses are sometimes divided into two types: (i) those where present physiological conditions can be seen to play a large part, (ii) those where the trouble is more clearly due to mental conflict. The latter are sometimes spoken of as the psychoneuroses. To the first group belong true neurasthenia and anxiety neurosis; in the second are included anxiety hysteria, "conversion" hysteria, and obsessional neurosis.

For NEURASTHENIA, see article above.

Anxiety Neurosis. In this form of neurosis the patient suffers from general apprehensiveness of some sort of evil and from acute attacks of anxiety which may involve trembling, sweating, nausea and diarrhoea and extreme mental distress. In the uncomplicated form of the illness, phobias do not develop. The subject does not accept any particular and permanent object for his anxiety to fasten to. Among the causes of the disturbance, irregularities of the sexual life are all-important. Hence the first step in treatment is to rectify such irregularities.

Anxiety Hysteria. In anxiety hysteria, actual phobias develop. These often originate in anxiety attacks, the phobia developing as a means of warding off the anxiety. To take an example, a patient may suffer an anxiety attack while walking in the street and afterward develop a phobia round the idea of going out. In an extreme case, such a phobia may keep him a prisoner in his house for years. The phobias that occur in this illness present great variety.

"Conversion" Hysteria. In this form of hysteria the unconscious conflict reaches expression, not through anxiety and phobias, but rather through physical symptoms. Sometimes hysterical attacks occur which are in the nature of fits. There may be twitchings and convulsive movements, with sensory disturbance and even loss of consciousness. Such attacks occur in the presence of other people, and the patient seldom

comes to any physical harm through them. The motives and conflicts giving rise to the symptoms remain unconscious; thus, there is a clear distinction between hysteria and deliberate malingering.

Obsessional Neurosis. In hysterical patients various aspects of the unconscious conflicts would seem to reach some sort of compromise in the formation of the symptoms. In obsessional patients, the mechanism is rather to set up all kinds of defences which shall keep certain of the conflicting tendencies from expression. This happens quite unconsciously, and the result is that the obsessional patient feels himself haunted by certain ideas and compelled to act in complicated and unreasonable ways without in the least knowing why.

The treatment of the neuroses must be on the lines of psychotherapy. See NERVOUS SYSTEM.

NEUROTIC, *nū rōt' ik*. A person who suffers or tends to suffer from neurosis. See NEUROSIS.

NEUSTRIA, *nū' strīa*. Anciently the name for the kingdom of the Western Franks; the eastern kingdom was Austrasia. The terms were used in the Merovingian period; they later came to indicate much smaller areas.

NEUTER. See GENDER.

NEUTRALITY (Latin, *neuter*, "neither"). When two or more states engage in war, other states that decide to take no part in the conflict, but to conduct themselves so that they can retain the friendship of both

belligerents, are termed *neutrals*, and their relation to belligerents is that of *neutrality*. The rights and duties of neutral states form one of the most important divisions of International Law. A neutral state must abstain from all active help to the belligerents. It is, however, under no obligation to prevent its subjects from trading and even supplying munitions of war, but such traders do so at the risk of having their goods captured as *contraband*. Belligerent ships have the right to search neutral ships suspected of carrying contraband goods, and, if such are found, of confiscating the goods, and, in some cases, the ship also. Apart from this, neutrals have the right to transport merchandise on the high seas free from interference by the belligerents.

If soldiers of one belligerent enter the territory of a neutral, they will be granted protection, though they become virtually prisoners of war in charge of the neutral until the close of hostilities. Belligerents' war vessels may not remain in neutral ports more than twenty-four hours, except on account of damage or stress of weather, and may take only sufficient supplies of fuel and provisions to enable them to reach a home port.

NEVADA, *ne vah' da*. A Pacific state of the U.S.A., with an area of 110,690 sq. miles and a population in 1930 of 91,058. It is the most sparsely populated state in the Union.

Nevada is an arid tableland, 2000 to 6000 ft. above the sea, broken by numerous mountain ranges rising to elevations of



NEVADA

Truckee River at Reno

Photo: Keystone

7000 to 10,000 ft., and crossed by a series of long parallel valleys. The south-east corner is the only part of the state with an elevation of less than 2000 ft. The lowest point, 700 ft. above the sea, is in the canyon of the Colorado River. In the Humboldt Range, near Utah, is Mount Wheeler, with an elevation of 13,058 ft., the highest mountain of the state.

The Owyhee, draining the north-east corner of the state, flows into Snake River, and the extreme south-east corner is drained by the Colorado. The Humboldt, Nevada's largest river, flows across the state in a crooked channel for 318 miles, and empties into Humboldt and Carson Sinks.

Pyramid Lake, 31 miles long and 7 to 11 miles in width, is the largest natural lake in the state. Lake Tahoe, on the California boundary, is 6225 ft. above the sea.

The climate of Nevada is mild and excessively dry. The winds are strong, but the skies are usually cloudless. The high altitude causes a large daily range in temperature; even in the hottest weather the nights are cool. The average annual temperature of the state is 49-6° F. There are long seasons of drought, and the annual rainfall averages but 10 in a year.

The completion of the 700 ft. Boulder Dam (1935) across the Colorado River marked the first step in the attempt to reclaim the "Bad Lands" in the south of the state by means of irrigation. The large accumulation of water behind the dam is tending to make the climate of the surrounding district more temperate.

Agriculture. In Nevada agriculture depends upon irrigation, and in 1930 the land under farms covered about 4,080,900 acres. Ranches containing from 50,000 to 100,000 acres of arid land are devoted to grazing.

The soil, when irrigated, is well adapted to the raising of forage crops, cereals, vegetables and fruits. The chief are hay, potatoes, wheat, oats, and barley.

Minerals. One of the richest mineral belts in the world extends along the California border and beyond the Colorado River into Arizona. The development of Nevada's mines began in 1859 with the discovery of the Comstock Lode, rich in gold and silver. Copper, now one of the most valuable products of the state, was not considered important until 1908. Lead, zinc, graphite, quicksilver, tungsten, sulphur, borax, lime, alum, potash, arsenic, salt, iron ore and platinum are also produced.

Government. Nevada has had only one state constitution, adopted in 1864.

The legislative body consists of a senate and assembly, meeting biennially. Senators are elected for four years, and members of the assembly for two years.

The executive power is vested in the Governor, Lieutenant-Governor, Secretary of State, Attorney-General, State Treasurer, Comptroller, Inspector of Mines and Surveyor-General.

At the head of the judiciary is a supreme court, having a chief justice and two associate judges elected for six years.

All public officers are subject to recall by the voters of the district from which they are elected. The largest city is Reno, with a population of 18,529. No other town has a population in excess of 6000. The capital of the state is Carson City (pop. 1596).

NEVILLE, HOUSE OF. The Nevilles were one of the most powerful and widely distributed families of medieval England, the main line being the Nevilles of Raby. For an important branch, see WARWICK, EARLS OF. The present representative of the Nevilles is Lord Abergavenny.

NEVILLE'S CROSS, BATTLE OF. See EDWARD III OF ENGLAND.

NEWARK. (1) See NOTTINGHAMSHIRE. (2) A city of New Jersey, U.S.A., situated on Newark Bay, an inlet of New York Harbour. Its leather industry has been prominent for over a century—shoes and other products finding a ready market in the metropolis. Among other manufactures are hats, jewellery, chairs and chemicals. The Port is now under the jurisdiction of the Port of New York. Population (1930) 442,337, nearly double the figure in 1900.

NEWARS, *néwars'*. See Nepal.

NEWBOLT, SIR HENRY JOHN (b. 1862). Educated at Clifton and at Corpus Christi, Oxford, he became a barrister and practised until 1899. Since then he has devoted himself to literature, except for the duration of the World War, when he was Controller of Wireless and Cables. His poems first made him famous. Many of them deal with the sea—"Admirals All," "Songs of the Fleet," "Drake's Drum," and "St. George's Day, 1918." Of his prose writings *The New June* is perhaps the best, a brilliant and beautifully phrased study of Richard II and his Court. In this novel, in *The Old Country*, in *The Book of the Happy Warrior*, and in his translations from Froissart he overcomes with apparent ease a difficulty which has troubled many writers, for his medieval people talk with simplicity and dignity, avoiding both modernisms and the "Ho' varlet" style. He published a *Naval History of the World War* in 1920 and an *English Anthology* in 1921.

NEW BRUNSWICK. The largest of the three Maritime Provinces of Canada. It has an area of 27,985 sq. miles, of which only 74 sq. miles are water surface.

The boundaries of the province are partly natural and partly artificial. On the south and east, except for the narrow Isthmus of Chignecto, which connects Nova Scotia with the mainland, it has water boundaries.

The population of New Brunswick at the census of 1931 was 408,255. About 97 per cent are of British or French Canadian stock. The capital is Fredericton (which see).

Physical Features. The most noteworthy physical characteristic of New Brunswick is the network of rivers, lakes and bays in all districts. The headwaters of the principal rivers are very near each other. Thus, in earlier times, the Indians made portages between the upper waters of the St. John, the Miramichi, the Restigouche and other rivers. Lumber is sent down the higher reaches.

The surface of New Brunswick is divided into two parts by a ridge or height of land extending from the south-west to the north-east corner. This height forms the watershed separating the eastern from the western rivers, the average altitude being from 1000 to 1500 ft. Mount Carleton, the highest point in the province, has an altitude of 2630 ft. The eastern coast, along the Gulf of St. Lawrence, is low and sandy, but on the south, along the shores of the Bay of Fundy, is another bold, rocky ridge. Except for these two ridges, which are extensions of the Appalachian chain, the surface is a low, rolling plain.

Flora and Fauna. Game of all kinds is plentiful, but is protected by long close seasons. Large game preserves have been established at the heads of the Miramichi, Tobique, and several other rivers. Moose,

caribou and deer are still common, as are wolves, foxes, beavers, martens, skunks, otters, minks, rabbits and squirrels. Geese, ducks, partridges and other game birds are abundant. The rivers and many small lakes are stocked with salmon, trout, bass, and other game fish. The sea fisheries yield principally lobsters, oysters, herring, cod and smelt.

The abundance of game is due in part to the protection of the forests. Black spruce is the most common tree, but is closely followed by hemlock, cedar, birch, beech, oak and ash.

Agriculture. The prominence of lumbering, and the westward trend of population, have somewhat obscured the importance of the farm. Yet nearly one-half of the working population are engaged in agriculture.

The most productive regions in New Brunswick are the alluvial lands along the rivers. The uplands, though less cultivated, are for the most part fertile, and yield fine crops of hay and oats. Perhaps a quarter of the total area, comprising heath, bogs and swamps, was formerly regarded as waste land, but with proper drainage now produces large crops of hay.

Hay is the most valuable crop, and potatoes rank second.

Hardy fruits, especially apples, are grown extensively in the river valleys, and berries and small fruits are abundant everywhere. The raising of livestock, especially sheep and dairy cows, is receiving increasing attention throughout the province, and fur farming has recently become important in all three of the Maritime Provinces.



REVERSIBLE FALLS, ST. JOHN, NEW BRUNSWICK
Photo. Canadian Official News Bureau

Lumbering. When the first settlers came to New Brunswick, practically the whole area was covered with forests, but fires and lumbermen have destroyed one-quarter of them. The abundance of trees, the nearness of the forests to the ports, and the facilities for logging furnished by the many rivers have combined to make lumbering second only to agriculture among the great industries

production in New Brunswick, which has an average value of £400,000, coal represents from fifteen to twenty per cent. Of the other minerals which are known to exist, the most valuable are iron, nickel, manganese, antimony, salt and oil.

Trade and Manufacture. New Brunswick now has about 2000 miles of railway in operation, and is served by the Canadian



ST. JOHN HARBOUR, NEW BRUNSWICK
Photo: Royal Canadian Air Force

of the province. The provincial government controls the cut of timber on crownlands by issuing timber licences to the highest bidder. The manufacture of wood pulp is growing steadily. The forest lands are now estimated to cover more than 21,475 sq. miles.

Fisheries. The commercial fisheries rank third among the industries. The market values of the sardine and the herring catch are about one-fifth each of the total.

Mineral Resources. Practically the whole of the triangular section lying south-east of a line drawn from Fredericton north-east to Chaleur Bay—a little more than one-third of the entire province—belongs geologically to the Carboniferous period. Bituminous coal is known to exist throughout most of this section, but for the most part it is impure or in thin seams. Of the annual mineral

National system, the Canadian Pacific, and a number of local lines. Its long coast-line and excellent harbours have aided development. St. John (which see) is the chief port.

The chief article of export is lumber. New Brunswick has over 870 manufacturing establishments, whose products have a total value of nearly £15,000,000 annually.

Government. The government of New Brunswick is like that of the other provinces of the Dominion. The chief executive is the Lieutenant-Governor who, on the advice of the Premier, appoints the executive council, or cabinet, which is composed of members of the legislative assembly. As in all the provinces, the cabinet or ministry is responsible to the assembly and holds office only so long as it commands the confidence of a majority of the members. The ministry is composed

of the Premier, Provincial Secretary and Treasurer, Attorney-General, and the Ministers of Agriculture, Lands and Mines, Health and Labour, and Public Works. The legislative assembly, composed of forty-eight members, is elected for five years.

There is a good system of education, which is free and undenominational. The provincial normal school and the provincial university, both at Fredericton, are open to all persons, irrespective of creed.

History. The history of New Brunswick as a separate colony begins in 1784. Previous to that year, it was first a part of Acadia and later of Nova Scotia. The earliest settlement within its border—that made by Champlain (as his own quaint books of voyages tell) and De Monts in 1604 at the mouth of the St. Croix River—was soon abandoned. The first English settlement was Manguerville, established in 1762, but the foundation of the province was really laid in 1783, when thousands of United Empire Loyalists emigrated from New England and settled in Canada. In the next year, 1784, it was organized as a separate colony.

The new colony prospered, and was gradually enlarged by the arrival of immigrants from the British Isles. In the long struggle to secure responsible government, the leader was Lemuel Allan Wilmet, who later became the first Lieutenant-General of the newly constituted province. Responsible government was finally established in 1848. In 1867 New Brunswick, under the leadership of Sir Samuel Leonard Tilley, became one of the original provinces of the Canadian confederation.

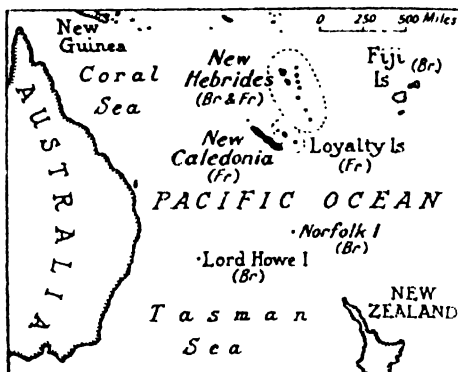
NEWBURY. See BERKSHIRE.

NEWBURY, BATTLES OF. See REBELLION, THE GREAT.

NEW CALEDONIA. A French island in the South Pacific within the tropics, about 700 miles east of Queensland. Its area is 8548 sq. miles. The island is narrow and mountainous; a coral reef lies off most of the coasts. The temperature is uniformly high, and rain occurs in all months of the year. Many tropical crops flourish, but minerals, particularly in the serpentine rocks, are the most important product. Nickel ore, reduced locally with hydro-electric power, and chrome ore are specially noteworthy. Outside Canada this is the chief source of nickel. Cobalt, manganese, iron, lead, copper, gold and several other minerals are also found.

The population numbers 57,165 (1931), of which 39,000 are natives and the remainder chiefly French. The island was formerly a convict settlement. Noumea (population 10,708), is the capital and chief harbour. Trade is chiefly with France.

New Caledonia was discovered and named by Captain James Cook in 1774. Missionaries arrived about 1840 and France took possession in 1853, on the eve of Britain



deciding on a similar move. Transportation began in 1864 and lasted until 1895. Administration is now by a Governor, assisted by a privy council of six nominated members and an elected council-general of 15 members.

Dependencies of New Caledonia include the Isle of Pines, the Wallis Archipelago, and the Futuna, Huon and Loyalty groups.

NEWCASTLE. See NEW SOUTH WALES.
NEWCASTLE, DUKES OF. "Bess of Hardwick," that noted shrew, who was later to cause so much trouble to her fourth husband, the Earl of Shrewsbury, took as her second husband Sir William Cavendish. From their son William descend the Dukes of Devonshire. William's brother, Charles, had a son WILLIAM (1592-1676), who in 1628 was created Earl of Newcastle. In 1638 he was appointed Governor to the eight-year-old Charles, Prince of Wales. Newcastle was a man of letters, a keen sportsman, and a superb horseman. He won the boy's love, and Charles appears to have profited by his admirable advice—to use unfailing courtesy, and to study life rather than books. In 1642 he seized Newcastle for the King, thus keeping open continental communications. He captured York, defeated Lord Essex, driving him into Hull, and later took that city. After the battle at Marston Moor, against which he had advised, he quarrelled with



DUKE OF NEWCASTLE
(National Portrait Gallery)

Prince Rupert and retired abroad, where he married the learned Margaret Lucas. He was created a Duke after the Restoration. Clarendon says that "the fatigue of a general he did not understand," but other authorities have described Newcastle's "Whitecoats" as the best infantry on either side.

The dukedom was revived in 1694 for his granddaughter's husband, John Holles, and again in 1715 for THOMAS PELHAM HOLLES, nephew to John. This second grant was in consideration of zeal shown against the Jacobites in that year. Thomas, Duke of Newcastle (1693-1768), was a leading Whig. He attached himself to Walpole, becoming Secretary of State in 1724. On the death in 1737 of Queen Caroline, he supported George II's military design, and the peace-loving Walpole was dismissed. In 1743 Newcastle's brother, Henry Pelham, became First Lord of the Treasury, and in the next year the brothers forced George II to dismiss Carteret, who had been in charge of Foreign Affairs since the fall of Walpole. In 1746 they insisted on William Pitt being Paymaster of the Forces. Newcastle's chief work in all this had been the party organization, the most important part of which was the bribery, but in 1754 his brother died and he took his place as Premier. Two years later the Seven Years War broke out, and the incompetence of the Ministry was revealed by the condition of our military arrangements. When Minorca fell, a scapegoat was found in Admiral Byng, but public anger was great and Newcastle had to resign. A year later he was recalled and took Pitt into partnership. The accession of George III took the patronage out of his hands, and in 1762 he resigned. Until his death he was occupied in political intrigue, although he only once more held office, as Privy Seal in 1765. Newcastle was a remarkable party manager rather than a statesman, and he made himself so influential that George II had twice to bow to his will.

NEWCASTLE-UPON-TYNE. On the north bank and about 8 miles from the mouth of the River Tyne, stands the city, county, and County Borough of Newcastle-upon-Tyne, with a population, in 1931, of 283,156. It is served by the L.N.E.R., and is 272 miles north of London. The whole of the north-and-south traffic of the East Coast railway route between England and Scotland, both passenger and goods, passes through the Central Station. The city is within the geographical county of Northumberland, but was created a county in itself by charter of King Henry IV in 1400. It became a city in 1882, and a County Borough in 1888.

Newcastle is the chief port and centre of the Northumberland and Durham coalfield,

and has an important shipbuilding industry. It is an ancient "bridge" port, and a modern manufacturing seaport town. It was here that the production of locomotives first became an established industry.

The Cathedral, dedicated to St. Nicholas of Myra, is mainly the work of fourteenth-century builders, though the tower and steeple were added about 1430. There is also a Roman Catholic Cathedral (St. Mary's),



THE CASTLE KEEP, NEWCASTLE

This massive keep, with walls 14 ft. thick, was built by Henry II.

Photo: Taylor

dating from 1844. Among the other important buildings of Newcastle should be mentioned the keep (built c. 1174) of the castle, which gave its name to the town. Portions of the wall that enclosed the town in Edwardian times remain.

The various bridges call for mention. Tyne Bridge, the most recent of these, was opened in 1928 by King George V. King Edward VII, in 1906, opened the King Edward VII Bridge (a railway bridge). The other bridges are: the High Level Bridge (1849); the Redheugh Suspension Bridge (reconstructed in 1900); and the Swing Bridge (1876), built on the site of various ancient bridges, one of which was constructed by Hadrian about A.D. 121. These bridges all connect with Gateshead.

Within the city are the sites of two of the camps or forts of the Roman Wall, built in the reign of the Emperor Hadrian and extending from a short distance east of the city boundary to Bowness on the Solway Firth, a distance of 73 miles.

NEWCOMEN, *nū kum' en*, THOMAS (1663-1729). An English engineer who contributed to the development of the steam engine. His engine used the cylinder as a condenser. See STEAM ENGINE.

NEW DEAL. See ROOSEVELT, F. D., PRESIDENT.

NEW FOREST. See HAMPSHIRE.

NEWFOUNDLAND. A rugged island lying off the entrance to the Gulf of St. Lawrence; it forms, with Labrador, the Dominion of Newfoundland. It is separated from Labrador by Belle Isle Strait.

Physical Features. The island, roughly triangular, covers an area of 42,734 sq. miles. Its steep cliffs and rocky headlands are penetrated by deep fiords, and by many large and sheltered bays which are dotted with a number of rugged islets.

The interior is in part a rocky tableland, broken by low, parallel ranges crossing the

island from north-east to south-west, and by isolated peaks known as *tolls*. Most of it is at an elevation of over 1000 ft. Large herds of caribou roam the forests and hills, and bear, fox, lynx, marten and beaver are also numerous. The Newfoundland dog is the only animal peculiar to the island, but it is now found there but rarely. In the valleys there are wide marshes and many lakes, bordered by forests of pine, birch, juniper, maple, spruce and fir.

The north-east coast is washed by the Labrador Current, which lengthens the winter and delays the spring. However, it moderates the heat of summer, and gives to Newfoundland a mild but damp climate in the summer and early autumn. The south east has a warmer climate and is the most thickly populated part.

The People. The inhabitants are descended from early English, Scottish and Irish fisher-folk. Nearly half of the population is to be found on the Avalon Peninsula on the south-east coast, where the capital and largest city, St. John's (population, 43,176), is situated. Other towns are Harbour Grace, Bonavista, Carbonear, Twillingate,



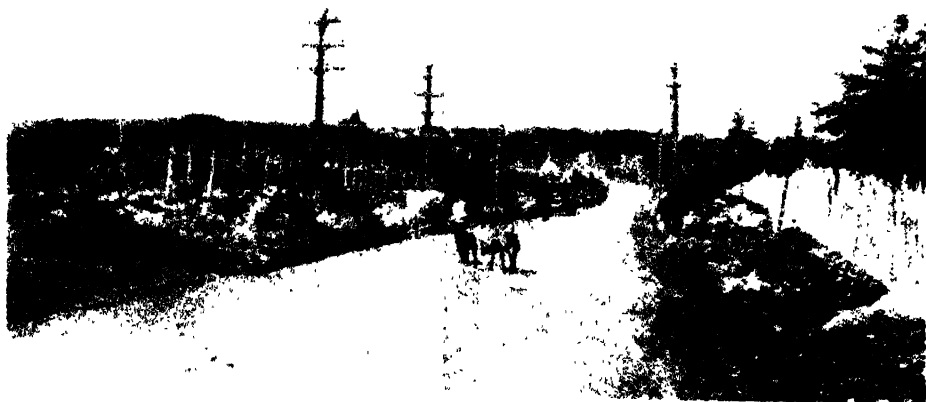
NEWFOUNDLAND FISHING VILLAGE

Quidi Vidi is similar to many other villages on the Newfoundland coast.

Photo: Topical

and Grand Falls, all of which have populations of between 3000 and 4500. The population of the island (1934) was 285,863, or, with Labrador, 290,274. The schools are denominational and are controlled by the religious bodies

Because for many years little attention was paid to any interest but fishing, the arable river valleys long lay idle and neglected. The government offered a bonus for cleared land in 1891 and subsequent years, and since then agriculture has been gradu-



HIGH ROAD NEAR KELLISGREWS, NEWFOUNDLAND

Photo: Newfoundland Trade Commission

Resources. The coast waters swarm with fish, and to its fisheries the Dominion owes its very existence. This industry employs more than one-fourth of the entire population. The cod fishery is the most productive; lobster, herring and salmon are also caught

and are increasing, but neither soil nor climate is very favourable. Hay, potatoes, cabbage, turnips, and oats are the chief products, and horses, cattle, sheep and pigs are reared.

Copper ore exists in great quantities, and there are deposits of iron, lead, and silver.



SCHOONERS WINDBOUND AT ST. JOHN'S

Photo: Newfoundland Trade Commission

in large quantities, and sealing is important. The seals are hair, not fur, seals, and locally are known as *harps* and *hoods*. Seal-fishing on the ice has been practically continuous since 1809, and the annual catch sometimes reaches nearly 240,000.

coal and iron ore are mined extensively, and copper was formerly of much importance. Manufacturing is represented chiefly by the pulp and paper industry. There are large mills at Grand Falls and Corner Brook on the Humber River. The

output of pulp has risen considerably in recent years. Mineral deposits, timber and water power of great value have been added to Newfoundland's possessions by the enlargement of Labrador (which see). Trade is chiefly with Canada, the United States and the United Kingdom.

There are over 850 miles of railway; most was taken over by the government in 1923. In 1925 a new steamer service, connecting the Newfoundland railway system at Port-aux-Basques with the Canadian railways at North Sydney, was established.

Government and History. The laws of the Dominion were made, before 1933, by a

(1713), France recognized the sovereignty of Britain, but reserved the exclusive right to the cod fisheries on the west coast, and to Miquelon and St. Pierre Islands as fishing stations.

The development of the colony was retarded by the exclusion of all interests but fishing, and the government was in the hands of fishing admirals for a long period. In 1832 representative government was granted the island, and in 1855 responsible government followed.

The years from 1919 to 1924 were marked by considerable internal dissension; the dispute with Quebec over the boundary of



HARBOUR GRACE, NEWFOUNDLAND

Photo: Newfoundland Trade Commission

Parliament consisting of a Legislative Council of not more than 24 members, holding office for life, and a House of Assembly of 27 members, elected by universal suffrage.

In 1933, because of acute financial difficulties, Newfoundland temporarily relinquished its self-government, and a Commission was set up consisting of six members appointed by the Crown, with the Governor as presiding officer, in whom were vested all the powers previously exercised by the legislature and council.

Newfoundland is the oldest of Great Britain's overseas possessions. The earliest visitors were Portuguese, Spanish and French fishermen; and when Sir Humphrey Gilbert in 1583 took possession of the island in the name of Queen Elizabeth, he found "a place very populous and much frequented," and added, "the English command all there." By the Treaty of Utrecht

Labrador also caused difficulty, but was settled in 1927, when the Privy Council fixed the western limits of Labrador at the Atlantic watershed, thus adding thousands of square miles to its recognized area.

The question of Newfoundland joining the Canadian confederation has come up from time to time, sometimes on the initiative of one country, sometimes of the other, and has been an issue in Newfoundland elections, but the union has not yet been brought about. The Imperial Conference held in London in 1926 was most significant in that it sanctioned the practical independence of six Dominions, including Newfoundland. See **SR. JOHN'S.**

NEWFOUNDLAND DOG. With the exception of the great Saint Bernard of Switzerland, possibly no other dog is so useful to mankind as the Newfoundland, for it is well known for its work in saving drowning people. The Newfoundland dog was first

brought to the attention of Europeans toward the close of the eighteenth century. As the original dogs are of a different breed, it is supposed that the Newfoundland, as now usually known, is a result of the crossing of the native dogs with others introduced from Europe in the sixteenth century and later.

The Newfoundland has broad shoulders, powerful legs, a long tail and massive head. Usually the dense coat is black, but a light coat with black markings is by no means uncommon. Some have bronze markings. A full-grown animal is about 27 in. high; dogs should weigh 140-150 lb., and bitches 110-120 lb.

NEW GUINEA. An island separated from Australia by Torres Strait. Excepting Greenland, it is the largest island in the world, and has an area of 312,300 sq. miles and a population of about 1,000,000. The interior, especially in the west, is little known. A lofty central range of mountains, rising in places to 15,000 ft., extends the whole length of the island, with a broken coastal range on the north and considerable alluvial plains, especially round the Fly River, on the south. The coasts have coral reefs in many parts. Climate is hot and rainy throughout the year, with a tendency towards a dry season in the south in summer. On the lowlands there are dense equatorial forests, but the higher slopes have temperate vegetation. The fauna includes marsupials, wild boars, crocodiles, and birds of paradise. Several races of man are found, including negritos, mainly in the interior and negroid Papuans, chiefly inhabiting the lowlands. Most live under petty chieftains in primitive conditions, hunting and fishing and engaging in a little cultivation of bananas and coconuts. Explorations between the Fly and Strickland Rivers (1935) and along the Ramu River in the north (1936) revealed the existence of races of light-skinned pygmies, hitherto unsuspected.

Dutch New Guinea. This occupies the western half of the island, with an area of 152,000 sq. miles and a population of 200,000, including only 250 Europeans. Primitive conditions of warring tribes still prevail, and the Stone Age persists in part. On the north there is a little copra cultivation, but there are no settlements of any size. For administrative purposes, Dutch New Guinea is an outpost of Ternate in the Molucca Islands; it was annexed in 1848.

Papua, or British New Guinea, is in the south-east of the island. It covers 90,540 sq. miles, including several islands, of which the Louisiades are the chief. The Commonwealth has administered it since 1901, renaming it Papua in 1906. From a British



FEATHERED CEREMONIAL DANCES FROM
NEW GUINEA
Photo. U. & U.



NATIVES OF NORTH NEW GUINEA PREPARING FOR AN ORDIAI
Photo: Nederland Linc



NATIVES OF NEW GUINEA
 They eat with chopsticks from a communal bowl.
Photo: U. & U.

protectorate in 1884, annexation followed in 1887. Much of the area is low-lying and very fertile; cotton, tobacco, coconuts, sago and many fibres do well, and plantations, as well as native agriculture, are increasing; rubber also succeeds. The government leases land, which it buys from the natives, to planters; private purchase is not allowed. On the coasts there is some pearling and bêche-de-mer collecting. Gold is mined, and a new copper field promises well. Indications of mineral oil have been found. Port Moresby is the administrative centre, and from there pacification of the turbulent tribes has steadily spread. There are a number of missionary schools. The total population is estimated at 275,000, (1107 Europeans).

The Territory of New Guinea, in the north eastern part, was formerly Kaiser Wilhelm Land, having been annexed by Germany in 1884. It was seized by Australian forces in 1914, and is now administered by the Commonwealth under a mandate from the League of Nations (1920). The territory, which includes the Bismarck Archipelago (New Britain, New Ireland, etc.) and some of the Solomon Islands (Bougainville and Buka), has an area of 93,000 sq. miles and a population of some 460,000, including 1500 British and 1200 Chinese. Production is similar to that in Papua, but the mainland is more highly developed. Native agriculture is being encouraged rather than plantations. There is some gold. Rabaul, in New Britain, with a white population of

about 1800, is the administrative centre; it is a well-laid-out town with a good harbour.

NEW HAMPSHIRE. A northern state of the American Union, with an area of 9302 sq. miles (of which 310 sq. miles are water surface), and a population in 1930 of 465,293. Manchester, with a population of 76,834, is the largest city and manufacturing centre. Other cities with populations over 20,000 are Nashua, Concord (the capital), 25,228, and Berlin.

The Land. New Hampshire is famous for its forest-covered hills and rugged mountains with deep glens. The only low part of the state is in the south-east, where the land meets the sea in sandy beaches, along which there are salt marshes and tidal creeks. Beyond the Merrimack River there are broad fields and rolling hills, which become more rugged in the central part of the state, merging into the lofty Presidential and Franconia ranges of the White Mountains. The Presidential Range is the highest, with eight of its summits rising above 5000 ft. The loftiest peak is Mount Washington, 6292 ft. high. North and south of the White Mountains are high, rounded hills, separated by wide, rolling valleys. Five important rivers rise in the mountains of New Hampshire: the Connecticut, the Merrimack, the Saco and Androscoggin, and the Piscataqua. Severe floods sometimes occur with the melting snows.

Agriculture. In general the soil is poor, although fertile in parts along the Con-



CONCORD, THE CAPITAL OF NEW HAMPSHIRE

Photo: U. & U.



"PALISADES" OF THE HUDSON, NEW JERSEY
Photo U. & U.

necticut and other rivers, and farmlands occupy nearly 40 per cent of the whole area of the state.

Livestock and poultry, dairying, fruit-growing and market gardening are the most important branches of agriculture. Orchards abound in southern and central New Hampshire, and the apples are of the best type. Of the crops, hay and forage are the most important; others are potatoes and maize.

Granite and mica are the chief mineral products of the State.

Manufactures. New Hampshire's importance as a manufacturing state is due to the great amount of available water power, the proximity of markets, and the facilities for transport. In Manchester are large cotton mills. Boots and shoes, paper and wood pulp, woollen, worsted and felt goods are all manufactured in the state. Lumber, hosiery, knitted goods and textile machinery are also produced.

Government. The present constitution is a revised and amended form of that adopted in 1877.

The legislative power is vested in a legislature consisting of a senate of twenty-four members and a house of representatives containing over 400 members.

The executive power is vested in a Governor and an advisory council of five members elected for two years. A Secretary of State and a Treasurer are elected by the legislature.

Judges, excluding justices of the peace who serve for five years, hold permanent appointments, with a retiring age of 70.

NEW HEBRIDES ISLANDS. A Pacific group of tropical islands, north-west of Australia, consisting of about eight principal isles and many smaller ones. Their combined area is about 5700 sq. miles. The soil produces various fruits in abundance. Coffee and copra are grown for trade. The population is about 60,000.

NEW JERSEY. An Atlantic State of the American Union, with an area of 8224 sq. miles and a population in 1930 of 4,041,334. For so small a state, New Jersey is densely peopled. Cities with a population of over 50,000 are Newark (which see), Jersey City



HUDSON RIVER

Docks at Hoboken, New Jersey, with New York in the distance.

Photo U & U

(430-715), Paterson, Trenton (the capital), Bayonne, East Orange, Atlantic City, Passaic, Hoboken, Union City and Irvington.

The Land. The north-west section of the state is crossed from north-east to south-west by parallel bands of rounded, wooded mountains, the loftiest being the Kittatinny range, rising from the banks of the Delaware. The range reaches its highest point on the New York boundary, where High Point is 1805 ft. above sea level.

A gently rolling coastal plain comprises the entire southern portion of the state. It is bordered by salt marshes and shallow lagoons.

The whole state drains into the Atlantic on the western slopes of the Kittatinny Range, drained by the Delaware, but the rivers of the greater part of the state flow east directly to the ocean. The largest of the coastal rivers are the Passaic and Hackensack, emptying into Newark Bay; the Raritan flowing into Raritan Bay; the Mullica and Great Egg rivers, flowing into coast lagoons; and the Maurice, draining the southern end of the state into Delaware Bay.

Agriculture and Industries. Lying between two great cities and having many of its own, New Jersey specializes in intensive market gardening, especially in the northern district. In all, 40 per cent of the land area is farmed, and vegetables of every kind are grown. Orchard fruits, especially peaches, flourish in the south.

There is an extensive dairying district in the north-west of the state. Fishing grounds in the sheltered bays, shallow coast lagoons and tidal rivers, and the proximity of markets have made the fishing industry important.

Much clay is mined, and bricks, tiles and pottery are made in great quantities. Zinc also is extensively mined, and cement is manufactured.

At Bayonne are found the largest oil refineries in the world. The smelting and refining of copper and the production of copper wire employ large numbers. Jersey City, the eastern terminus of numerous railways, has a large number of foundries, locomotive works, motor-car factories and other industries.

Government. The present and second constitution of New Jersey was adopted in 1844 and amended in 1875 and 1897.

The legislative department consists of a senate of twenty-one members and a general assembly of sixty members.

The executive power is vested in a Governor, elected by the people for three years. A Treasurer and Comptroller are appointed by the legislature, and the Secretary of State, Attorney-General, etc., by the Governor.

In the judicial department the highest court is the court of errors and appeals, consisting of the Chancellor and justices of the supreme court and six other judges, appointed for six years.

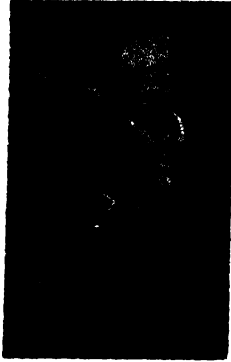
NEWMAN, JOHN HENRY (1801-1890). An English cardinal of the Roman Catholic Church.

He was born in London, studied at Trinity College, Oxford, and in 1822 was elected a Fellow of Oriel College. In 1824 he was ordained a minister of the Church of England, and became curate of St. Clement's, Oxford. Four years later, he was made vicar of St. Mary's, Oxford, and in that position became noted for his sermons. Originally a supporter of the Evangelical or Low Church party, he gradually changed his views until in 1830, he was an acknowledged High Churchman.

In the "Oxford Movement," which sought to restore to the Established Church both fervour and the spirit of the non-juror

bishops, he was the recognized leader, about a third of the *Tracts for the Times* being from his pen; but, meanwhile, he had begun to doubt the position of the Anglican Church, and to feel far less hostile toward Roman

Catholicism (see OXFORD MOVEMENT). In 1843 he resigned from St. Mary's, left Oxford, and two years later was admitted into the Roman Catholic Church. In 1846 he was ordained a priest, and on his return to England settled near Birmingham, where he established an English house of the Congregation of the Oratory. From 1854 to 1858 he was rector of the



CARDINAL NEWMAN
Photo Brown Bros

Catholic University at Dublin.

He was created a cardinal in 1879 by Pope Leo XIII.

Newman was constantly occupied with literary work, producing his famous autobiography, *Apologia pro Vita Sua*, in 1864, as a result of a controversy with Charles Kingsley. His other works include *Essay in Aid of a Grammar of Assent* and some verse, of which the *Dream of Gerontius* ranks highest. He was the author of

several hymns, including "Lead, Kindly Light."

NEWMARKET. See SUFFOLK.

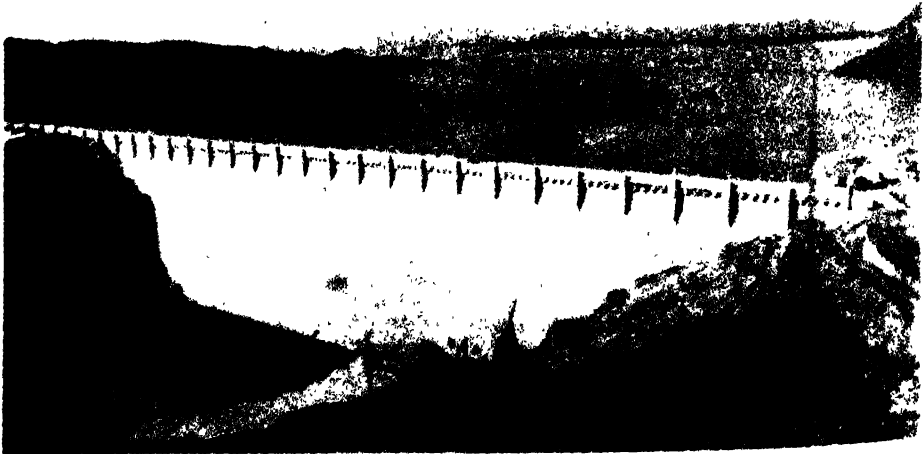
NEW MEXICO. A state of the American Union, with an area of 122,034 sq. miles and a population in 1930 of 423,317.

The only cities having over 10,000 inhabitants are Albuquerque, Santa Fe (11,176) and Roswell.

The Land. New Mexico is a vast elevated plain sloping gradually south and south-east, and broken by steep, rocky mountains and mesas. A level, arid region known as the Llano Estacado, or Staked Plain, lies in the south-east. It is separated from the foothills of the front range of the Rocky Mountains by the valley of the Pecos River, the only part of the state having an elevation of less than 3000 ft. The northern boundary of New Mexico is penetrated near the centre by the Rocky Mountains. There are very lofty peaks in this district, among them being Truchas, rising to 13,156 ft and others with altitudes of over 12,000 ft.

The Rio Grande Valley crosses the state from north to south between the central mountains and the lofty plateau forming the Continental Divide.

Agriculture. The agriculture of the state is chiefly confined to the river valleys and irrigated sections. The roots of the yucca which grows in the arid parts, are used as a substitute for soap. Stock-raising is an important branch of agriculture. In the sheep industry, New Mexico is usually seventh among the states; both cattle and sheep are



ELEPHANT BUTTE DAM

This dam, impounding water from the Rio Grande River uses it to irrigate dry but potentially fertile land in New Mexico.

Photo: U. & U.

kept in ranches in the semi-arid plains and mountain slopes.

Cotton (a very recent introduction), wheat, maize and hay are the principal crops in value and in acreage. Apples, peaches, pears, grapes and cantaloupes are among the fruit crops of especial value.

Minerals. Coal deposits are widely distributed throughout the state. In the first quarter of the century, the total value of the gold, silver, copper, lead and zinc mined annually increased from some £500,000 to almost £3,500,000. The production of petroleum is increasing. Gypsum, iron ore, mica,

8,000,000 acres in six national forests are protected.

Government. New Mexico's constitution was adopted in 1911.

The legislative department consists of a senate of twenty-four members and a house of representatives of forty-nine members.

The executive department consists of the Governor, Lieutenant-Governor, Secretary of State, Auditor, Treasurer, Attorney-General, Superintendent of public instruction and Commissioner of public lands; these are all elected for terms of two years.

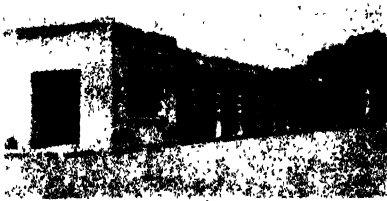
The judicial department consists of a supreme court having five justices, nine district courts, county probate courts, justices of the peace, and inferior courts.

NEW ORLEANS, LOUISIANA, U.S.A. The second port in the United States for foreign and domestic commerce, and the largest cotton market in the world. It is situated on the eastern bank of the Mississippi River, 110 miles from the Gulf of Mexico. The population is 458,762 (1930).

Since New Orleans lies, at an average, only 5 ft. above the level of the Gulf of Mexico, and below the high-water level of the Mississippi, it has been necessary to build levees, 30 to 35 ft. high, to protect the city from flood.

The Public Cotton Warehouse has a storage capacity of 420,000 bales. About 7500 bales can be loaded on ships in a day, and 1,000,000 bales are dealt with every year. The city is also a great sugar market. There are many rice mills. Annual rice exports amount to over 60,000,000 lb. Bananas, petroleum, and timber are also exported.

The city is famous for its Mardi Gras festival (Shrove Tuesday in England)



SANTA FE

Former Governor's Palace and the oldest government building in the U.S.A. It was built in 1617.

clay, merschaum, sand, gravel, salt, mineral waters, and turquoise and other precious stones are produced.

Manufactures. New Mexico is the least important manufacturing state in the Union. Timber, coke, flour and grist-mill industries are prominent. The extensive raising of sheep has developed large wool-scouring plant. There are fewer than 200 factories.

Forests. There are over 13,000,000 acres of forest in the north-western mountains, with pine predominating, and of this area



NEW ORLEANS

Photo: U. & U.

NEWPORT. A County Borough and port of Monmouthshire, with an area of 4568 acres and a population in 1931 of 89,198, situated 148 miles from London, near the mouth of the River Usk, and served by the main line of the G.W.R. Its importance as a commercial and industrial centre dates from the middle of the last century, and is due to its proximity to the coal measures of north and west Monmouthshire, and to its favourable position on the Bristol Channel. The port is also largely used for the shipment of general cargo. The principal exports are coal and iron, and the tonnage passing in and out of the port approaches 8,000,000 annually. A number of considerable industries have arisen in connection with the port. Its staple trade is the shipment of coal and iron, and the import of iron ore, timber, etc. It manufactures steel sheets, iron and steel pipes, castings, chemicals, glue, rails, rope and patent fuel. Shipbuilding is also important.

At the beginning of the nineteenth century the population was little in excess of 1000, yet the history of Newport is traced to the Conquest; under the Normans it had a large castle and was a walled town.

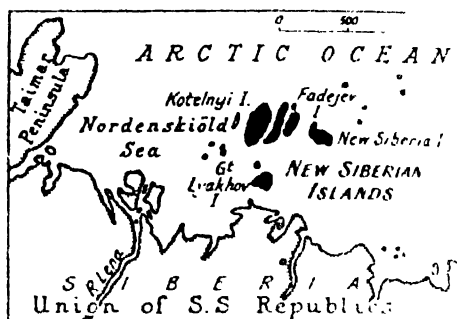
NEWPORT. A Municipal Borough and market town in the Isle of Wight, and the commercial and administrative centre of the island, situated on the upper reach of the Medina estuary, which is navigable by large vessels to this point. It was first incorporated at the end of the twelfth century. The early nineteenth-century Guildhall is to the design of John Nash, and the distinctive clock tower commemorates the jubilee of Queen Victoria. Carisbrooke Castle is within

the town boundary: it is on the site of a Roman fort, and was erected at the beginning of the twelfth century.

Commercially, Newport is a port of some consequence. One of the principal imports is timber. There are also saw mills, joinery works and engineering shops, and holiday traffic is increasing, since, geographically Newport is the touring centre of the Isle of Wight. Population (1931) 11,313.

NEW RADNOR. See RADNORSHIRE

NEW SIBERIAN ISLANDS. An archipelago of four large and a few small islands lying off the coast of Siberia to the east of



the Lena delta. They are built of continental rocks, and geologically would appear to be detached fragments of the mainland. The surface is rugged but not of a great height, and there is no permanent ice sheet. Climate is severely Arctic, and vegetation is confined to sparse tundra in places. The group has never been inhabited, but is occasionally visited by Samoyeds and Russian hunters seeking mammoth ivory. Exploration of the islands was due mainly to Bunge and von



GENERAL VIEW OF NEWPORT, I.O.W.

Photo: Fox

Toll late in the nineteenth century, but their discovery was made by Lyakhov in 1770. Russia claims sovereignty over the group.

NEW SOUTH WALES. The most populous state in the Australian Commonwealth and Great Britain's first colony in Australia, this state has an area of 309,432 sq. miles. There is a population of 2,636,460, excluding about 60,000 full-blooded aboriginals, of whom 1000 are wholly or partly civilized. As in Australia generally, the people are mainly of British descent. There is no established Church.

Sydney, Port Stephens and Port Hunter (on which is Newcastle); Twofold, Jervis, Botany, and Broken bays. A narrow strip of fertile land lies between the sea and the slopes of the Eastern Highlands, which extend across the State from north to south, nearly parallel to the coast. This irregular mountain system is broken into three minor ranges, that in the north being known as the New England Mountains, the central range being called the Blue Mountains, and the southern the Australian Alps. These highlands, especially in the central region are scarred by deep canyons and ravines.



FARM LANDS ON THE BELLINGER RIVER, NEW SOUTH WALES

Among the religious bodies, the Anglicans are most numerous. Other prominent denominations are the Roman Catholics, Presbyterians, Methodists, Congregationalists and Baptists. Many of the Asiatic inhabitants and aboriginals have been converted to Christianity; the non-Christians, many of whom are Jews, number about 10,000.

Education is under State control, and instruction is compulsory for pupils between the ages of 7 and 14. The percentage of illiteracy is low. The University of Sydney, founded in 1850, has 3000 students. From the kindergarten to the university, education is free to all. There are also many denominational and private schools of various grades.

The Land. The rugged and broken coast rises steeply from the sea, and its rocky headlands shelter many good harbours, including Port Jackson, on which lies

The loftiest elevation in the state, Mount Kosciuszko, reaches 7350 ft. above the sea. The western slopes of these ranges broaden into a rolling plateau which merges into the great arid grass-covered plains occupying the western part of the state.

The chief rivers are the Murray, which forms the greater part of the southern boundary; its tributaries, the Lachlan and the Darling; the Murrumbidgee, an affluent of the latter; the Hunter, an important commercial stream at the mouth of which Newcastle is situated; and the Hawkesbury. Many other streams in the western plains evaporate during the dry season, as does much of the Darling.

The climate of New South Wales ranges from the dry heat of the western plains to the coolness of the damp coast regions. The temperature at Sydney is moderate and annually averages 63° F., but in the interior, extremes of both cold and heat are known.

The rainfall ranges from 50 in. on the coast to 10 in. on the western plains.

Resources and Industries. Grazing, the first industry, is still the chief source of wealth. The scarcity of water renders the western and larger part of the state unsuitable for agriculture, but the extensive grass-covered plains afford excellent pasturage for sheep, cattle, and horses. The millions of sheep provide one-half of the total wool output of Australia, which is the greatest wool-producing country in the world. Cattle are much less numerous, but dairy cows are important.

The cultivated area is chiefly confined to

associated with stock-raising and mining; the principal establishments include tanneries, woollen factories, soap and tallow works, foundries, machine shops, and clothing factories. About 45 per cent of the manufacturing in the Commonwealth is carried on in New South Wales.

Transport in the more settled parts is good, and there are many miles of improved roads, affording communication with the railways. Most of the railway mileage, which amounts to over 6200, and over 200 miles of electric-car line are owned by the state.

Sydney Harbour Bridge, one of the longest



HYDE PARK, SYDNEY, FROM ELIZABETH STREET
In the background is the Roman Catholic Cathedral.
Photo: Australian Trade Publications

the coast region and tablelands, but with the increasing use of irrigation, it is being extended in the west, where the soil is productive when watered. Over one-half of the tilled land is devoted to wheat; hay, maize, green forage, oats, potatoes, tobacco, and fruit, chiefly oranges, lemons, and grapes, are also produced in quantity.

The state is rich in mineral resources, producing two-thirds of the output of Australia. The coalfields produce something over 7,000,000 tons in a year. The first gold produced in Australia was mined in New South Wales, where it was long the chief mineral product. Its production has declined in recent years, and has been surpassed by the output of silver. Broken Hill is the centre of the silver and zinc industry. Copper, tin, and iron are less important. Lead, platinum, and opals are other mineral products.

There has been a steady growth in the manufacturing interests, which are closely

single-arch bridges in the world (total length, 3770 ft.), was opened to traffic in 1932.

Government and History. The executive power is vested in a Governor, appointed by the Crown, and a responsible Ministry. The law-making body is a Parliament consisting of a legislative council of sixty members, elected for twelve years, and a legislative assembly composed of ninety members elected by universal suffrage. Women have the same political rights as men.

New South Wales was discovered and named in 1770 by Captain Cook. The first settlement in Australia was the penal colony established at Botany Bay in 1788 and shortly afterward moved to Port Jackson. Free settlers began to arrive in 1817, after it had been shown that the land was capable of sustaining an increasing population. Convict immigration ended in 1850.

In 1842 a new constitution was adopted, but responsible government was not insti-

tuted until 1856. The rather vague limits of the colony were changed with the institution of Victoria as a separate colony in 1851, and the separation of Queensland in 1859. The discovery of gold in 1851 caused a rapid growth in population and prosperity. In 1901 the colony was incorporated as one of the six original States in the Australian Commonwealth. In 1908 the Federal Territory of 940 square miles, about 150 miles to the south-east of Sydney, was ceded to the

and steel industries. Population, including suburbs, 105,700.

Other towns are: Broken Hill (26,750), Lithgow (13,480), Cessnock (14,550), Goulburn (15,000), Albany (10,830), and Bathurst (10,540).

NEWSPAPERS AND JOURNALISM. Although the newspaper, as we know it to-day, is of comparatively recent origin, civilized man's innate desire for knowledge led to the publication of news, in some form or other, at a very early date.

Julius Caesar might almost have claimed the title of the world's first newspaper proprietor, for the *Acta Diurna* were issued under his personal supervision as long ago as 61 B.C. They contained a daily record of all that happened in Rome, and were produced in a style not unlike that to which we are accustomed in the age of the special correspondent.

The advent of printing, following the Renaissance of learning, made possible the production of a newspaper on modern lines, but it was not until 1622 that the first true news-sheet made its appearance, although some earlier publications are important.

Early Disfavour. Journalists once laboured under many difficulties, not the least of which was that nothing was allowed to be printed without the sanction of the licenser appointed by the Crown; and the regulation and punishment of printers was provided for by the Star Chamber, publication of news being deemed "a right of the Crown, an interference with matters of State, and an incitement to breach of the peace."

Cromwell went even further than his Jacobite predecessors in suppressing newspapers by fines and imprisonment, and even by flogging. His Council of State set up the first official publications, *Mercurius Politicus* and *The Parliamentary Intelligencer*, which subsequently became the *London Gazette*, still published by H.M. Stationery Office.

Newspapers sprang up all over the country at the Restoration, but their existence was precarious and journalism might legitimately have been scheduled as a "dangerous occupation," so beset with peril was the setting of pen to paper for publication.

The oldest existing English newspaper, *Barrow's Worcester Journal*, first appeared in 1690. The *Daily Courant* was the first daily newspaper (1703) and the *Evening Post* (1705) the first evening. But it was not until the end of the eighteenth century that any of the present great national dailies came into existence. The *Morning Post* dates from 1772, and *The Times* (as the *London Daily Universal Register*) from 1785.



MARTIN PLACE, SYDNEY

Commonwealth as the site for the new capital of Canberra. See AUSTRALIA.

Towns. Nearly 68 per cent of the population of New South Wales is urban. Sydney, the largest city and the capital, is described in a separate article. There are twelve other towns with a population of over 10,000.

Newcastle lies on the coast, 62 miles north-east of Sydney. The harbour has an area of 5,000 acres, affording berthing room for vessels of largest tonnage; it is defended by forts and has two breakwaters. Situated in the heart of the coal district, the city, in addition to being a leading port, is a centre of manufacturing, particularly of the iron

Invention of the steam-engine and of improved presses marked the early days of the last century, but it was only after the abolition of the paper duties by Gladstone, and repeal of the Advertisement Duty (1853) and of the Stamp Duty (1861), that newspapers could be produced at a price which brought them within the reach of the "man in the street."

Universal compulsory education increased the potential reading public in an amazing manner, and, within a couple of decades, literate people could be counted in millions instead of thousands, and the so-called "popular" newspaper made its appearance to meet the insatiable demand for cheap reading matter.

The Modern Newspaper is ever-changing in its efforts to keep pace with the requirements of its readers, but one might, in general terms, divide the Press into three sections—responsible, popular, and localized.

In the first category come a limited number of papers such as *The Times*, *Daily Telegraph*, *Morning Post*, *Manchester Guardian*. They eschew sensationalism in any form, are meticulously accurate, place "first things first." Their appeal is to the well-educated, thinking man or woman, who wishes to have unbiased news on which to frame his (or her) opinions, and the reasoned opinions of responsible, expert writers.

"Popular" newspapers are concerned more with the "human interest" side of the news, with features and with illustrations. They are lighter, more sensational and devote less attention to politics and foreign affairs. Their appeal is essential to the masses, and, in some instances, particularly to women.

"Localized" newspapers, published in provincial centres, concentrate on the best possible service of news from the areas they serve. They often strike a singularly happy medium between the first two categories, and some of them might well serve as models to the national publications, with their huge circulations.

Fundamentally, all newspapers are the same. In their pages, in varying proportion, are to be found news, comment, illustrations, feature articles, fiction, and advertisements. It is the varying quantity and quality of these ingredients that distinguish one publication from another.

The modern tendency of the entire Press is towards brightness of "make-up," designed to please the eye of the reader. This "brightness" has been exaggerated, in some papers, to an alarming and almost ludicrous extent—huge headlines and a jazz pattern of "box panels" and other little journalistic stunts giving their pages the appearance of a jig-saw puzzle.

But the rush and hurry of the modern world, and the thousand and one distractions provided for its inhabitants, have sealed the doom of the long article which had to be read carefully and pondered over. To-day, people read their papers at breakfast, in the train that takes them to their work, or at odd moments.

Press and Public. That newspapers are supplying a public demand is evidenced by their huge circulations. Both the *Daily Herald* and *Daily Express* sell more than two million copies each day, for instance.

To this extent the Press panders to the public. Yet, in spite of the fact that newspaper publication is a business—more, an industry employing hundreds of thousands of people—its controllers do not forget that it is also a public service. Newspaper proprietors might with ease make enormous profits by adopting, in certain circumstances, an anti-social policy. They would never do so.

It is because of the honesty and integrity of the Press that it still has a power, almost invariably exercised for the good of the community. But, powerful as it still is, the British Press no longer wields the enormous political influence that it did a few decades ago. This is due not only to the fact that the population has become more politically educated and is not inclined to take its opinions ready-made, but also to the waning faiths that have been espoused and abandoned with the completest intransigence by some of the Press "lords."

No longer can one say truthfully that the public has implicit faith in the Press: it is frequently suspect, though usually without justification. For the ordinary man is not as credulous as was his grandfather, and he does not believe a thing merely because it appears in print.

The Work of the Journalist. Although thousands of people gain their living from the newspapers of a country, the "key men" are the journalists. A newspaper without advertisements is a possibility, a newspaper without news is a contradiction in terms.

Journalism is an "open profession," for, obviously, it would be impossible to have a qualifying examination. The qualification for full membership insisted upon by the two journalistic organizations is three years' practical experience in a newspaper office. If a young man, or woman, has been able to "hold down" a job for this period, it is assumed that he has qualified himself.

The only sound manner in which to become a journalist is to commence in the late 'teens as a junior on a provincial newspaper—the London papers have no time for beginners and expect every member of their staffs to

pull full weight. Some people drift into newspaper work at a later age, but usually because of special knowledge of a particular subject and by way of outside contributions as a preliminary.

Every journalist—apart from the special writer—must start as a reporter. The reporter supplies the rough castings from which the newspaper is machined and assembled by sub-editors, under the direction of the editor. There are dozens of different "ranks" on the staff of a daily paper, but that is, briefly, the procedure.

Organization. The editor, under the direction of his board or of a proprietor, is responsible for the general policy of a newspaper and—in law—for its entire contents, from title to imprint. He is essentially an administrator. Assistant editor, night editor, chief sub-editor and news-editor are his principal executive heads of departments, with leader writers, feature editor, women's page editor, sports editor and others in collaboration.

News services are organized by the news editor. He sends his own reporters out to cover stories and orders matter from news agencies and district correspondents. In addition, every paper takes a regular service of news from one or more of the big agencies, and their copy pours in over the teleprinters from morning until night and from night until morning.

The vast mass of material goes to the sub-editors, by way of a "copy-taster," who reports what is obviously unsuitable. A further selection is made by the chief sub-editor, who allocates the remainder to the sub-editors under his control. They, in turn, "cut" and re-write the copy according to his instructions and write headings for it. Frequently a message running into thousands of words is summarized into a quarter of a column. Fully three-quarters of the matter received in each newspaper office daily fails to find its way into print.

The chief sub-editor works to a definite "make-up" for each page, and instructs the sub-editors to prepare the copy accordingly. When it has his approval, it is rushed to the composing room and set up on mechanical type-setting machines. Proofs are read carefully by a staff of "readers," and they are also "vetted" by a barrister, who is an expert on the law of libel and is retained on the staff especially for this purpose.

The type, set in lines, is placed in a "forme," the exact size of the newspaper page, together with page heading, date, etc., and column rules between the columns. But however nice be the judgment of the chief and other sub-editors, it is not often that every column of matter "pans out" the

exact length. So there is a "make-up sub-editor" who does nothing but superintend the placing of the type in the forme, making a "cut" here and there as necessary, or ordering a paragraph or small item to be added to fill.

When all is ready, the forme is locked tight, and an impression of it is obtained on a "flog" (sheet of stout *papier mâché*) by placing both in a hot press. This flog is a positive (the type, of course, being in reverse), and it forms a matrix, from which a semi-circular metal plate is cast. This plate is, again, a negative, and, when it is affixed to the rotary printing-machines, the newspaper is printed direct from its surface.

This is, necessarily, a very brief description of the complicated processes, the elaborate mechanical plant and the highly skilled labour necessary to produce a modern newspaper.

The amount of capital invested in newspapers is stupendous, and great business acumen is required to make possible a good profit to the investors, while maintaining a full sense of responsibility to the public and giving a "square deal" to the thousands of workers who are directly employed—from editors down to packers.

Professional Associations cover all concerned. Every journalist can be a member of the Institute of Journalists (incorporated by Royal Charter), and all but those holding executive posts members of the National Union of Journalists (a registered trade union). These two bodies do extremely good work for their members and for the profession as a whole. They give legal aid, pay unemployment benefit, and assist widows and orphans. The N.U.J. has entered into minimum wage agreements with the proprietors' organizations.

Mechanical and clerical staffs are invariably members of their appropriate trade unions, some of which (such as the London Society of Compositors) are among the closest craft corporations known.

Owners, too, realize the value of co-operation. The London daily and Sunday newspapers are represented by the Newspaper Proprietors' Association, and the provincial papers by the Newspaper Society. They deal not only with problems arising within the industry, but with outside matters, such as approaches to the Government or public bodies.

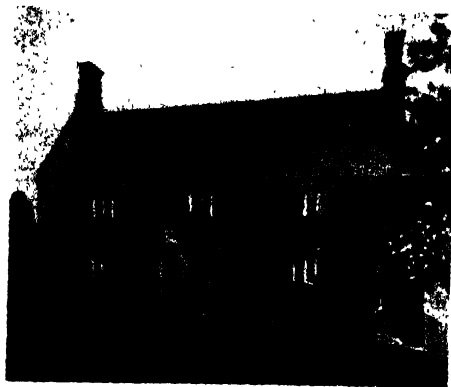
The Press of to-day is frequently criticized. These criticisms are, as a rule, the result of ignorance both of the meticulous care that is taken to ensure accuracy and to avoid giving offence, and of the terrific pressure under which every one must work who is concerned with newspaper production.

NEWT. A small, tailed animal with an elongated, lizard-like body and four weak legs, related to the frog, toad and salamander, and with them classed among the amphibia (which see). Newts and salamanders are tailed amphibians, the tail of the newt being flatter than that of the salamander. Newts hatch from eggs, and in an immature stage breathe by means of gills and live in the water. In the course of time, they develop lungs and take to the land, though there are some species that remain in the water all their lives, never losing their gills. All newts are fond of moist, cool places. They cast their skins at various times, and possess the power of reproducing lost limbs.

Scientific Names. Newts form the genus *Triton* in the family *Salamandridae*. The British species are the common (spotted) newt, *T. vulgaris*; the great (crested) newt, *T. cristatus*; and the webbed newt, *T. palmatus*. The latter species is rare.

NEWTON, SIR ISAAC (1642-1727). An English mathematician, astronomer, and natural philosopher, famed as the discoverer of many important laws in science, but

portant achievements in the whole history of natural science. Newton was born on Christmas Day, 1642, at Woolsthorpe in



BIRTHPLACE OF NEWTON
Photo: Visual Education Service

Lincolnshire. He was admitted to Trinity College, Cambridge, in 1661, and in 1665 received his degree of B.A.

He announced his discovery of the binomial theorem, the method of tangent and other important mathematical principles within the next two years.

His contributions to the theory of light were also of great importance. By admitting a beam of sunlight through a small aperture into a darkened room, so that the beam passed through a prism, he showed that white light is a combination of seven primary colours. In 1704 he published, under the title *Opticks*, the results of his experiments and studies in colour and light. He also made an exhaustive study of the reflecting telescope, so useful to him in his investigations, and he succeeded in constructing a type of instrument that has been of great value to astronomers.

Newton's election to membership of the Royal Society in 1672 showed the esteem in which he was held. In 1669, four years after his graduation, he had been appointed professor of mathematics at Cambridge. After the flight of James II, he became a member of the Convention Parliament, holding his seat until the assembly was dissolved in 1690. In 1696 he became Warden of the Mint, and three years later was appointed Master of the Mint, continuing in the latter office until his death. He was again elected to Parliament in 1701, this time representing the University of Cambridge, and during the last twenty-four years of his life, was president of the Royal Society. In 1705 he was knighted. Newton's greatest work, which established the fundamental laws of modern



SIR ISAAC NEWTON

honoured chiefly because he formulated and made known the principle of universal gravitation. This is one of the most im-

physics, is the *Principia Mathematica* (Mathematical Principles).

To-day, his theory of gravitation has been questioned in the light of the new discoveries of physics and chemistry. Einstein has rejected Newton's explanation of gravitation, though not the fact of its operation, but all scientists admit that the great Englishman laid the foundations upon which Einstein built his relativity theory. See GRAVITATION; MECHANICS.

NEW WINDSOR. More popularly known as Windsor. A Municipal Borough of Berkshire, famous for the royal castle and Eton College. Area 4616 acres. Population (1931) 2840. William the Conqueror chose the site of the castle, but Edward III had the old building destroyed and began a new one, of which the round tower forms the centre of the present buildings. Additions have been made to the structure which now covers about twenty-four acres and is representative of every period of castle building from the Norman to the Edwardian. St. George's Chapel (begun by Edward IV and finished by Henry VIII; in the vault of which lie the bodies of Henry VIII, Charles I, George III, William IV, George V, and other sovereigns); and the Albert Memorial Chapel (begun by Henry III, rebuilt by Henry VII and completed by Queen Victoria; the burial place of Edward VII), are in the Lower Ward to the west of the central tower. To the east in the Upper Ward are the royal apartments and the great state rooms. For an illustration of the castle see under WINDSOR, THE HOUSE OF.

NEW YEAR. The custom of celebrating the first day of the calendar year is observed in almost every country. Usually, the celebration consists of religious ceremonies, preceded or followed by festivities. In the Orient, homes are decorated, gifts are exchanged, and the compliments of the season are extended to friends and even strangers.

Customs similar to those mentioned above prevailed among the earliest of the nations. The Chinese, the Egyptians, the Jews and the Romans, though observing different days as the commencement of the year, all marked them with elaborate ceremonies.

Among the Druids, the priests cut down branches of the sacred mistletoe on New Year's Day, 10th March in their calendar. After this ceremony, they feasted and offered sacrifices.

The Christian Church from the beginning has observed the first day of the year. Christmas Day, Easter Day, 1st March, and 25th March, the Feast of the Annunciation, have all been celebrated at various times and in various countries as the opening of the

new year, and it is only since the sixteenth century, when the Gregorian Calendar was adopted, that 1st January has become generally recognized as New Year's Day.

The Jewish New Year, which occurs about the time of the autumnal equinox, is the first of several days of religious commemoration.

NEW YORK CITY. Formerly called New Amsterdam and New Orange, the metropo-



EARLIEST KNOWN VIEW OF NEW YORK
Joost Hartger's view of Nieuw Amsterdam; from
a book printed in Amsterdam, 1651.

lis of New York State, largest city of the western hemisphere; is second only to London in population among the cities of the world. Five Boroughs and counties in one, New

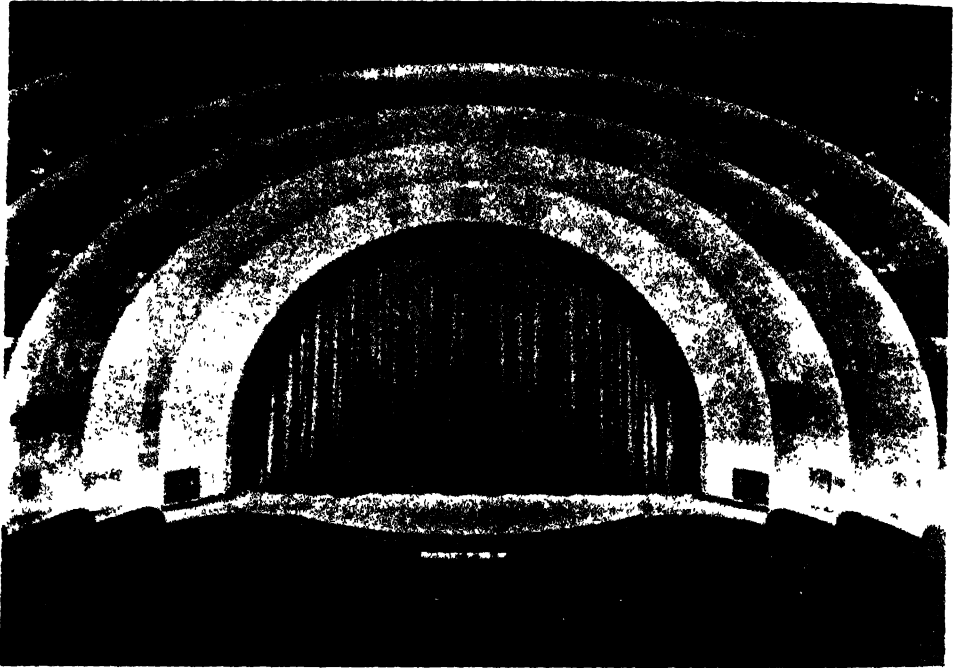


BLOCK HOUSE AND CITY GATE, NEW YORK, 1674
The lower part of Wall Street is now on this site

York spreads out to the north, east, and south from the congested acres of its centre, Manhattan Island. Originally, the municipal boundaries of New York City coincided with the boundaries of Manhattan Island. In 1874, and again in 1895, portions of Westchester County were added, and in 1898 the act of consolidation made New York a greater municipality of five Boroughs. Including land and water surface, these have

a total area of 320 square miles. The Bronx, a portion of the mainland to the north and east, embraces about 38 square miles. Brooklyn, the "Home Borough," is a part of Long Island, and has an area of 80 square miles. Queens, also on Long Island, covers 121 square miles. Finally, Richmond Borough, or Staten Island, in the bay, has an area of 57 square miles. The Hudson River forms the entire western boundary of the

boundaries. Bedloe's, or Liberty, Island, near the northern end of the Upper Bay, is interesting as the site of the great "Statue of Liberty." Still nearer Manhattan is Ellis Island, where all immigrants must land for examination. Coney Island is a pleasure resort in the southern part of Brooklyn Borough, and this borough also claims dozens of small islands in Jamaica Bay. At the entrance to the East River is Governor's



STAGE OF RADIO CITY MUSIC HALL

The semi-circular proscenium arch has a ceiling motif of sun-rays carried out in the ornamental light grilles of the ceiling strips.

borough, separating it from New Jersey. The Hudson empties into Upper New York Bay at Battery Park, the southernmost tip of Manhattan Island. On the other side of the island is the East River, a tidal strait about 16 miles long and from 600 to 4000 ft. wide. The Boroughs of Manhattan and the Bronx border on the western shore of the river, and Queens and Brooklyn lie on its eastern side.

The Narrows, a passage about five-eighths of a mile wide at its narrowest point, divides the Bay into the Upper and Lower bays, the latter being a part of the Atlantic Ocean. Vessels enter the Lower Bay between Sandy Hook on the south and Rockaway Point on the north. Besides Manhattan and Staten, there are several islands within the city

Island, used by the United States government for military purposes, and in the river are Welfare, Ward's, and Randall's islands, on which are the city's institutions of correction and welfare.

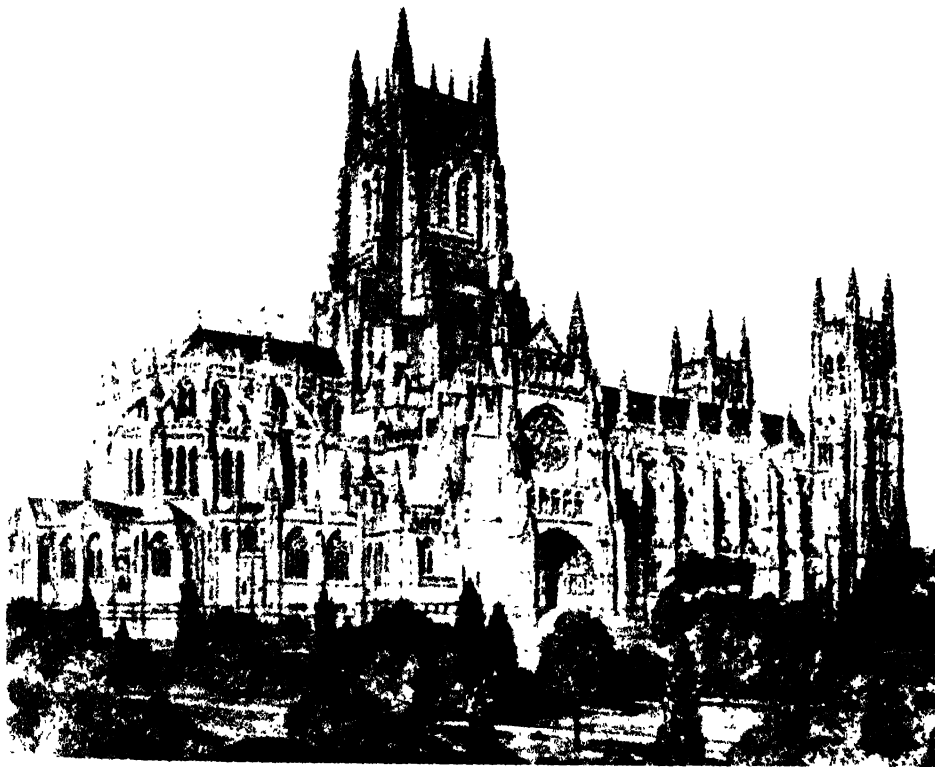
New York itself is a cosmopolitan city, for among the sixty different nationalities that make up its population, there are people of every continent and colour. The 1930 census reported a total of 2,788,625 persons of first-generation foreign-born parentage. In this city there are more Germans than there are in Bremen, more Irish than in Dublin, and more Italians than in Genoa. The Jewish population is 30 per cent of the total. Total population (1930) 6,930,446.

Financial, Commercial, and Government Buildings. The massive structures lining

Broadway house many of the world's great business corporations. The famous Woolworth Building, fifty-one stories high, contains 40 acres of floor space. At 23rd Street is the Flatiron Building, New York's first skyscraper, whose twenty-one stories rise from a narrow, triangular base, giving an effect of height and slenderness. At Times

splendid system of parks and squares which afford breathing spaces for the people of the city. At Battery Park, on the lower end of the island, may be seen a continual panorama of the movement of the harbour.

The open space of 840 acres known as Central Park is frequently visited in a single day by 100,000 persons.



CATHEDRAL OF ST. JOHN THE DIVINE, NEW YORK CITY

Photo U & U.

Square are the lofty V-shaped edifice of the New York Times and the imposing new building of the Paramount Company.

The Chrysler Building, seventy-seven stories, completed in 1930, and the Empire State Building, eighty-five stories, completed in 1931, are the world's tallest structures.

The City Hall is said to be one of the finest examples of architecture in America. The Criminal Court Building on Centre Street is connected by the so-called "Bridge of Sighs" with the great city prison, the Tombs.

Parks. Bowling Green is the oldest park in New York, and was used by the Dutch in early days as a market-place and as a park. From this small beginning has grown the

Brooklyn possesses a park, Prospect Park, which, though not so large as Central Park, is quite as beautiful. In the Bronx is a park of over 700 acres, well known for its zoological and botanical gardens.

Libraries and Museums. The New York Library has two departments—the reference and the circulation departments. The former, at Fifth Avenue and 42nd Street, is supported entirely by private funds. In it there are 2,082,858 volumes and pamphlets, and 4,000,000 people visit it annually. The circulation department has forty-seven branches, with a staff membership of over 750 persons.

The Metropolitan Museum of Art, near



NEW YORK BETWEEN 40TH AND 59TH STREETS
Seen across the East River from Long Island City.

Photo: U. & U.

Soth Street and Fifth Avenue, has a priceless collection of paintings, porcelains, pottery, textiles and other art objects. The Pierpont Morgan collection fills an entire wing, and contains a rich gathering of the European decorative arts. In the Museum of Natural History are found collections of the remains of prehistoric creatures. Other museums include those of the American Indian, founded in 1922, the Hispanic Society, and the New York Historical Society.

Educational Institutions. Two of the largest universities in the United States are situated in New York - Columbia University and New York University. Fordham University, in the Bronx, was founded in 1841 as St. John's College.

Bridges, Subways and Tunnels. There are numerous bridges of great size connecting the islands among themselves and with the mainland. Chief of these is the George Washington suspension bridge across the Hudson, the world's largest single span bridge (completed 1932); on the East River side, Queensborough and Brooklyn are two of the best known. The Triborough Bridge system, linking Manhattan, the Bronx and Queens, was inaugurated in July, 1936. The first "subway" was opened for traffic in 1904, since when a network of underground railway lines has been constructed beneath Manhattan, tunnels under the Hudson and East Rivers giving connection with the other boroughs and with Jersey City. These facilities are now supplemented by vehicular tunnels, as well as by a number of ferries. The elevated railways are a characteristic feature.

The only two great railway systems entering Manhattan proper are the New York Central and the Pennsylvania.

Commerce. In the port are 695 piers, which serve the needs of about 10,000 vessels, including the transatlantic liners. Two of these piers have been specially

adapted for the large new British and French liners. The chief exports are cotton, copper, machinery, illuminating oil, and hardware; the port also handles a large percentage of the import trade. With the opening of the Erie Canal, in 1825, the supremacy of New York as a commercial centre was assured, and it was given further impetus by the Barge Canal improvement. On 1st May, 1925, the ports of Newark and Perth Amboy, both in New Jersey, were placed under the jurisdiction of the Port of New York.

Airports. Included in the Metropolitan District of New York are a number of flying fields, both military and commercial. The military fields include Mitchel Field at Garden City, Rockaway Naval Air Station, and New York National Guard Field at New Dorp, Staten Island. The commercial fields are Curtiss Field at Garden City, Roosevelt at Mineola, and Hadley Field, the present air-mail terminus, near New Brunswick, N. J.

Government. Greater New York is governed by a Charter of 1898, amended in 1901. The legislative and financial powers of the various governmental units within Greater New York are vested in the Board of Estimate and Apportionment and the Board of Aldermen.

The city administration, with the exception of the department of finance and the department under the jurisdiction of the borough presidents, is centred in the office of the mayor. He has powers over thirty-six administrative agencies.

The New York City Municipal Assembly, created by the Home Rule Enabling Act of 1924, consists of two branches, namely, the Board of Estimate and Apportionment and the Board of Aldermen. It has power to adopt and amend local laws in relation to the property, affairs, and government of the city.

History. Although the region about New York was visited in 1524 by the Italian navigator

gator Verrazano, the earliest history of the city begins with the expeditions of Henry Hudson in 1609. In 1613 Fort Manhattan was built by a trading company, led by Adrian Block. A second company, the West India, was chartered in 1621. Fort Manhattan was demolished to make room for the larger Fort Amsterdam in 1635, and as the settlement grew, it became New Amsterdam.

New Amsterdam, incorporated as a city in 1653, with a population of about 800, passed under control of the English in 1664, and at once cast its old name aside in favour of New York, named after the Duke of York. Though the Dutch regained it in 1673, and named it New Orange, it was recovered by the English soon after, Sir Edmund Andros becoming Governor. From this time on, the place was known as New York, and it grew steadily in importance. Its later history is bound up with the eighteenth-century struggle for independence (for which see UNITED STATES—History). It was only during the latter half of the nineteenth century that New York finally outgrew such rivals as Boston and Philadelphia.

NEW YORK STATE. A Middle Atlantic State of the American Union. Its principal city, New York City, the second in size in the world, possesses one of the finest of natural harbours, and is situated practically on the Atlantic Ocean.

With an area of 49,204 square miles, of which 1550 square miles are water, New York is one of the smallest states of the Union, but it has ranked first in population since 1820, and had in 1930 a population of 12,588,066.

Apart from New York, the principal towns are Albany (127,412), capital of the state, with imposing buildings, Brooklyn (2,560,401), Buffalo (573,076), Richmond (158,346), Rochester (328,732), Syracuse (209,326), Utica (101,740) and Yonkers (134,646).

Physical Features. The northern and eastern sections of New York are mountainous, while the remainder of the state is a region of low plateaux and rolling plains. Excluding Long Island, the surface of which is low and level, New York can be divided into several well-marked physical regions.

Eastern Mountain Belt. This is a region of rugged hills and low mountains, the



WEST OF THE CENTRE OF MANHATTAN IN THE 42ND STREET AREA

Photo: P. & A.

continuation of the Green Mountains and of the Berkshire Hills of New England.

The Plateau Region and the Catskill Mountains. West of the Hudson River is the plateau region, which extends through Southern and Central New York almost to Lake Erie. The eastern limit of this plateau is formed by the Catskill Mountains.

The Adirondacks. This range has an area of over 5000 square miles and covers the north-eastern portion of the state. The Adirondack region is celebrated for its wild scenery. Mount Marcy, 5344 ft., is the highest point of the State.

Mohawk Valley. This wide pass forms the only great break in the Appalachian system and offers the best way to the interior.

The Hudson River rises in the Adirondacks, and is the most important river wholly within the state. It is navigable for large ships for a distance of over 150 miles. Its chief affluent is the Mohawk, which drains the central part of the state.

The rivers in the northern part of the state flow into Lakes Erie and Ontario and drain through the St. Lawrence into the Atlantic Ocean. Frequently there are deep gorges and waterfalls, chief among these are Niagara Falls. See **NIAGARA FALLS AND RIVER.**

Agriculture. Of the total land area, about 50 per cent is farmed. The chief crop is hay. Oats, with an acreage of 1,000,000 acres, rank first among the cereals in production. Market gardening is of great and increasing importance. Fruit is also raised in large quantities. With large regions in the state well suited by soil and climate for pasturage, and the large quantity of hay grown, it is natural that the raising of livestock and dairy-farming should constitute one of the chief occupations. Egg and poultry production are also steadily increasing.

Minerals and Manufactures. Iron ore is the chief mineral, while the clay deposits are mined for the manufacture of bricks, pottery, terra cotta, and porcelain. Granite, lime, stones, sandstones, and marble are quarried. Petroleum is obtained in the south-western part of the state; the oilfields here being a continuation of the Pennsylvania fields. In the same and adjacent regions is also found natural gas. The industries of New York are characterized rather by a great diversity of objects manufactured than by an overwhelming pre-eminence of any one industry. The value of the products is over \$2,000,000,000 annually.

Commerce. In commerce, New York surpasses all other states. Over one-third of the exports and nearly two-thirds of the imports of the United States pass through the port of New York City. Large as this foreign trade is, the coastwise trade is larger.

Government. New York is governed under the constitution adopted in 1894. This is the fourth constitution the state has had, the other three having been adopted in 1777, 1821, and 1846 respectively.

The executive officials, the Governor, Lieutenant-Governor, State Comptroller, and Attorney-General, are elected for two years; the Lieutenant-Governor presides over the Senate.

The legislative power is vested in a Senate of fifty-one members and an Assembly of 150 members.

The judicial system is headed by a Court of Appeals, a Supreme Court, and an Appellate Division of the Supreme Court. The highest court is the Court of Appeals, composed of a chief judge and nine associate judges, elected for fourteen years.

NEW ZEALAND. A British Dominion lying about 1200 miles to the south-east of Australia, in an isolated oceanic position almost the Antipodes of Great Britain. With an area of 103,722 sq. miles, the Dominion includes North Island, 44,281 sq. miles; South Island, 58,092 sq. miles; Stewart Island, 670 sq. miles; and the outlying Chatham Islands, 372 sq. miles. (Included within the rule of the Dominion are several small island groups in the Southern Ocean: Bounty, Antipodes, Snares, Auckland, Campbell, and others in the South Pacific; Kermadec, Union and Cook Islands (all these except the last two groups are uninhabited). The latter and certain League of Nations Mandates are referred to below.)

Physical Features. New Zealand stands on a submarine ridge which can be traced to the north and south and probably owes its origin in the main to the great foldings of Tertiary times, which were responsible for the chief mountain ranges encircling the Pacific and probably formed many other isles. On the whole, New Zealand is a mountainous land, and the chief feature is a broad range extending the extreme lengths of both North and South Islands, and interrupted only by Cook Strait, which separates the islands. In South Island this range, known as the Southern Alps, is lofty and continuous and lies on the western side of the island. The Alps have sixteen peaks over 10,000 ft. in height, of which Mount Cook, 12,349 ft., is the highest. In the Mount Cook area there are extensive icefields, and one glacier, Franz Josef, flows to 700 ft. above sea level on the west. In North Island the range continues in the Ruahine, Kaimanawa and Raukumara Ranges, where the heights do not exceed 5700 ft. There are, however, greater heights in North Island in the active volcanoes of Ruapehu (9715 ft.), and Ngauruhoe (7515 ft.) and dormant Tongariro (6458 ft.).

which lie in a volcanic plateau region in the middle of the island to the south of the Bay of Plenty. In that area there are several geysers and hot springs. Mount Egmont in North Island reaches 8260 ft. Plain areas are not very extensive, but concentrate the human population: many are alluvial plains, such as the well-known Canterbury and Southland Plains of South Island and the Waikato Plains behind Hauraki Gulf in North Island. The elevated Wanganui Plains of North Island are of a recent age. Earthquake shocks are not uncommon, especially around Cook Strait. The coasts vary very much, but many are well indented, owing to subsidence, and offer good natural harbours, fully adequate for the needs of the country. North Island, however, has long harbourless stretches on the west.

High relief and adequate rainfall support numerous rivers, but most are subject to torrential and liable to flood. They afford any useful navigable stretches, but many offer valuable water power. Among important electric schemes, which are few in number, are those of Horowhenua and Arapuni on the Waikato River, Manapouri and Waikare Moana, also in North Island, and Lakes Coleridge, Waitaki and Taupo in South Island. Among the lakes, those in North Island, due to volcanic causes, are the largest: those in South Island are due to glacial action and are mainly in the

Climate. In the main the climate is not unlike that of Great Britain, except that North Island has a warmer and sunnier summer and a milder winter, and South Island has a wetter west coast. The westerly winds, which blow strong, dominate the climate of South Island throughout the year,



CATHEDRAL SQUARE, CHRISTCHURCH
Photo: High Commissioner for New Zealand

but the eastern side is fairly sheltered and dry. North Island escapes these winds in summer, which is very warm but not without rain. The monthly temperatures of Auckland range from 51° F. to 67° F., and those of Invercargill from 41° F. to 57° F. Frosts are common in South Island but rare in North

Island. Snow never lies for long on low ground, sunshine is abundant, and windy days are numerous.

Plants and Animals. Forests were originally the vegetation of the western, and grass-lands of the eastern part of the country. Some of the forests are luxuriant with hānās, tree ferns, and a tangle of undergrowth. Characteristic trees are the kauri pine and the red and white pines. Much of the forest was cleared by settlers and much by fires, until at present only some 19 per cent of the land is forested and much timber has to be imported. The natural grass-lands have a poor tussock grass which has been much replaced by European meadow

grasses. A native plant of value is the phormium or New Zealand flax.

The only mammals native to the islands are two species of bat; the Maoris brought with them the rat and the dog. Deer were introduced, and now red and fallow deer are plentiful, and, with the wapiti, are hunted



MOUNTS TONGARIRO AND NGAURUHOE, NORTH ISLAND
The latter is New Zealand's only constantly active volcano
Photo: High Commissioner for New Zealand

highland regions. Stewart Island is rugged and forested, and is mainly used for sheep-raising and fishing. The Chatham Islands, about 500 miles east of South Island, carry some sheep.

A severe earthquake visited North Island in 1931, causing great destruction in Napier.



FRANZ JOSEF GLACIER, SOUTH ISLAND
Photo: High Commissioner for New Zealand

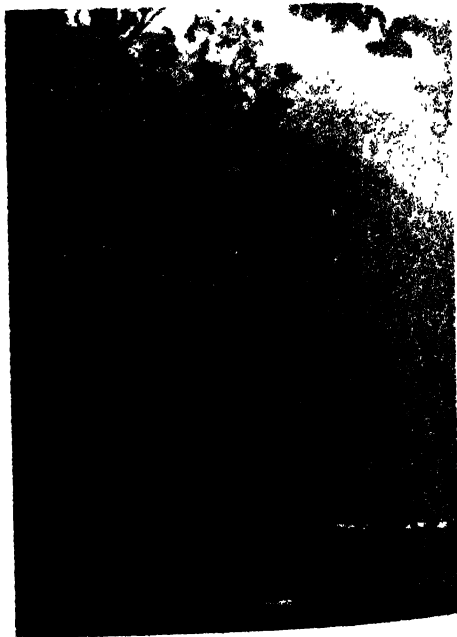
by sportsmen in the mountains. Insects are few, and snakes are not native. There are many beautiful native birds. The kea is a strange bird of the parrot family, found in the mountain regions of South Island. When pressed for food, it attacks sheep, which it kills to obtain the fat surrounding the kidneys.

Among the animals introduced into South Island from England were two rabbits, brought in 1859. Twenty years later, their countless descendants were eating so much grass that millions of acres of sheep land had to be abandoned. Only after years of government-supervised struggle, including the building of hundreds of miles of wire fence, was the pest controlled. In 1893, the climax of the fight, 17,000,000 rabbit skins were exported. The introduction of sheep has resulted more fortunately, for now nearly one-half the value of New Zealand's exports is credited to wool, mutton and skins.

Population, Religion, Education. New Zealand was originally peopled by a Polynesian race from Samoa called the Maoris. European population came late and increased slowly. By the end of the nineteenth century it was well under a million, and in 1936 was 1,560,000 of which North Island had over 60 per cent. This estimate includes Maoris, 73,259 in 1934 chiefly in North Island. Maoris are now increasing in number. They have equal rights of citizen

ship with the whites. Chinese number about 3000 and Indians 1000, but restrictions are now placed on the entry of non-Europeans. More than three-quarters of the population are New Zealand born, and practically all are of British descent, with a preponderance of Scots. In recent years immigration has been balanced by emigration, but normally the additions of settlers amount to over 2000 a year. New Zealanders have benefited by remoteness from Old World influences and traditions. They show the hardihood and self-reliance characteristic of pioneer people. Unhampered by precedent and prejudice, they have been particularly progressive in legislation, introducing ideas which were much later accepted by other nations (see below). There is no state religion. Anglicans and Presbyterians are most numerous, followed by Roman Catholics and Methodists. Education is compulsory between the ages of seven and fourteen, is secular and entirely free. There are also schools for the Maori. There are many incorporated or endowed secondary schools, a few private ones and several for Maoris. There are also technical schools and two colleges of agriculture. The University of New Zealand embraces Otago University at Dunedin, Canterbury University College at Christchurch, Auckland University College, and Victoria University College at Wellington.

Cities. In spite of the steady settlement



SOUND, SOUTHLAND, SOUTH ISLAND

of the land since the adoption of the land tax and other measures to break up the large estates, half the people of New Zealand live in towns, and about two-fifths of them in and about the communities of over 10,000 population. The principal cities are the following—

Auckland, the largest city, is on Waitemata Harbour, on the north-east of North Island. It lies on a volcanic isthmus 6 miles wide,

Otago, is on the south-eastern shore of South Island, at the head of a fine natural harbour, 15 miles from the sea. The city was founded in 1848 as a Scottish settlement; it soon became the commercial centre of the country because of rich gold mines. Although that importance has declined, it is still a busy trade and manufacturing city. The surrounding country is noted for wool-growing. The city manufactures large quantities of



DUNEDIN

Photo: High Commissioner for New Zealand

with Waitemata Harbour on the east and Manukau Harbour on the west. It is an important seaport. The chief industries are shipbuilding, sugar-refining, rope-making, and glass-blowing. Auckland has a University College, with a school of mines; and the best art gallery in New Zealand. Until 1865, Auckland was the capital city. Population, 221,000.

Christchurch, capital of Canterbury province, and one of the most prominent cities of South Island, is on the Avon River, 7 miles from the sea, and at the border of the Canterbury plains, famous for mutton sheep. It has factories of woollens, boots, furniture and railway stock. The city was founded in 1850, in connection with the Anglican Church. Christchurch is the seat of Canterbury University College. Population, 132,000.

Dunedin, the capital of the province of

woollen goods for home consumption and exports raw wool to England. It is the principal university town of New Zealand. Population 88,500.

WELLINGTON, the capital of the Dominion and one of the busiest seaports, lies on the southern coast of North Island, on the deep harbour of Port Nicholson. Because of its ideally central position, it was made the capital city in 1865. It was founded in 1840 by the New Zealand Company. It is the seat of Victoria University College. Because of the fear of a repetition of disastrous earthquakes which occurred soon after its founding, the city's buildings have been made chiefly of wood, but more solid materials are now being used. The Parliament buildings, as yet unfinished, are here. Wellington controls the sale and supply of milk, and has extensive butter and cheese factories. Population, 146,800.

Agriculture and Industries. Its soil and climate fit New Zealand pre-eminently for grazing, but cultivation of crops is of increasing importance. Of the occupied land, some 12 to 13 acres are grazing land compared with 1 acre under crops. More than half the grazing land is artificially sown pasture. In number of sheep New Zealand ranks sixth in the countries of the world. Sheep are fairly evenly distributed in the drier parts of both islands. Great care has been devoted to breeding, but it was the invention of refrigeration that gave a vast impetus to the industry by making the carcass as well as the wool of value. Some

locally. A fossil resin, known as kauri gum, has value in varnish manufacture.

New Zealand has not yet given much attention to the wealth which lies in the ocean; the fishing industry is little developed, and the same applies to whaling.

Manufacturing is not, so far, of great importance, although there are some 5000 manufactories and works. Most noticeable are establishments dealing with butter, cheese and chilled mutton. There are also woollen mills, engineering works, breweries, boot and shoe and furniture factories. The growing use of water power should help industrial development, but the home market



TE ARU FROM BROOKLYN, WELLINGTON
Photo: High Commissioner for New Zealand

7,000,000 carcasses may be exported in a year and over 140,000 tons of wool, which is about one-twelfth of the world's wool crop. Cattle are mainly in North Island, and dairy cattle are more important than beef cattle. Butter and cheese are exports of growing importance. Of the cereal crops wheat is the most important, and is mostly in the Canterbury region. The yield per acre is high, and the total produce is now about 9,000,000 bushels. Imported wheat supplements local supplies. Oats, barley and a little maize are also cultivated, and apples and some other fruits are grown. Phormium, or New Zealand flax, is a crop of some importance.

There are many minerals, but few of great consequence. Gold and silver have decreased in output. Coal of various kinds is found, but not in large quantities, and none is of Carboniferous age; the annual output of about 1,800,000 tons is used

is naturally small. The development of water power was made a government monopoly in 1908, and the right to establish hydro-electric plant was reserved in 1910.

Trade. Exports are mainly wool, butter, lamb and mutton, and cheese. These go chiefly to the United Kingdom. Apples, gold, timber, phormium, gum and honey are less important. In 1935 imports totaled £36,287,544 and exports £46,538,678. Of exports £38,921,568 went to Britain who exported £18,518,729 worth in return, mainly manufactured goods. Auckland and Wellington handle most of the overseas trade.

History and Government. In 1642 Abel Tasman, a Dutchman, sighted the islands, and, as far as known, he was the first white man to look upon these shores. He was prevented from landing by the hostile demonstrations of the natives. The Dutch called the new country *Nieuw Zeeland* (new sea

land). Nothing more is recorded until 1769, when Captain Cook landed on the North Island at Poverty Bay. He, too, had tussles with the natives, and was forced to shoot a number who attacked him. When better relations were established, he gave them seeds and turned pigs and fowls loose to supply them with meat. He visited the islands again in 1773, 1774, and 1777.

Soon whalers and traders began to come to the country, and in a short time a colony

a treaty was concluded with the Maoris, which guaranteed them the possession of their lands, while they ceded the sovereignty of the islands to Britain; but from 1860 to 1872 there was intermittent war. Since then there has been no trouble, and from the beginning of the twentieth century the Maoris have increased in number. See MAORIS.

Since 1907 New Zealand has been a Dominion. The Governor-General, sent from



ROUNDING UP CATTLE ON A NEW ZEALAND FARM

Photo. High Commissioner for New Zealand

was started. But, for practical purposes, it seemed to be a No Man's Land, overrun with escaped convicts and deserters from vessels. A mission was established in 1814, and others followed. They taught methods of agriculture and simple arts and crafts. The natives learned rapidly. Introduction of firearms into the native warfare gave the greatest impetus to white occupation, and between 1821 and 1827, devastation was carried far and wide.

The British Colonial Office did not seem particularly anxious to annex New Zealand. In 1833 a Resident was sent from New South Wales, but it was not until 1839 that the British Government appointed a Governor (since 1918, Governor-General). There were seven distinct colonies until 1853, when a single constitution was given them. In 1840

Great Britain, co-operates with the General Assembly, which consists of an appointed Legislative Council of thirty, including three Maoris, and an elected House of Representatives with eighty members, including four Maoris. The natives have, besides their representatives, 12,000 voters.

New Zealand has probably enacted more advanced social legislation than any other country, and the labour laws are especially enlightened. Many of the enactments were long ridiculed by other countries, but New Zealand ideas have since been incorporated in the laws of other states. The government *land tax*, adopted first in 1876, has divided the large estates and made the land available for settlers. The tax is on land only, not on improvements, and there is an especially

heavy tax for absentee owners. In 1892 the government adopted the policy of purchasing estates from owners who grumbled at taxes, and then, instead of selling the lands so acquired, leased them in parcels of 2000 acres, or less, for 999 years. In 1907 and 1908, the longer-lease term gave way to one of only 66 years, with right of renewal at a new rate. The tenant, if he wishes, may pay the government as much as 90 per cent

on this plan. The fall in the prices of all produce, especially wool and meat, in view of the abnormal land values and over-importation of goods, resulted in a financial crisis in 1921. This was made more serious by high taxes and increased government expenditure. However, the rigid economy of the governing party (which seriously affected its popularity), provision for unemployment, and growth of the co-operative



DOUBTFUL SOUND, SOUTH ISLAND, NEW ZEALAND

of the price of his land, so as to reduce his rent, but he cannot purchase it outright.

There has been public ownership of railways since 1870. An income tax was adopted in 1891, the vote for Parliament given to women (who had long before had municipal franchise) in 1893, arbitration of labour disputes was made compulsory in 1894, old-age pensions were granted in 1898, a universal minimum wage was established in 1899, and participation in strikes was declared an offence punishable by fine in 1908.

The State also owns the telegraphs and telephones; for gold extraction the rights to the cyanide process; has a monopoly on "trading stamps"; inspects and grades exports; and advances and loans money to settlers.

After the World War, a special law was passed to place returned soldiers, who so desired, on the land, and in other ways to give them financial assistance. By July, 1922, the country had spent almost £30,000,000

marketing associations were factors which assisted a return to normal.

Viscount Galway became Governor-General in April, 1935. New Zealand has not yet taken advantage of the Statute of Westminster.

The more important dependencies of New Zealand are—

Cook Islands, with outlying islands covering a total area of 180 sq. miles and having a Polynesian population of 10,802; these were annexed in 1901. Their tropical position allows the cultivation of coconuts for copra, and some citrus and other fruits for the New Zealand market. The **Union of Tokelau Islands**, lying nearer the equator to the north-east of the Cook Islands, have an area of 4 sq. miles and a native population of 1179, producing copra. They were detached from the Gilbert and Ellice group and handed over to New Zealand administration in 1926. **Western Samoa** (Savaii, 703 sq.

miles, Upolu, 430 sq. miles and some small islands) are mountainous but fairly productive. Copra, taro and bananas are the chief crops. The population is 49,000 Samoans, 3000 Europeans and about 1000 Chinese. These islands were German territory from 1899 to 1914 and are now administered by New Zealand under Mandate.

The **Ross Dependency** of Antarctica is nominally under New Zealand jurisdiction, but there are no inhabitants.



MARSHAL NEY
Photo Brown Bros

NEY, *neh*, MICHEL (1769-1815). A Marshal of France who distinguished himself in the service of Napoleon. Ney was the son of a cooper. At the age of nineteen he joined a regiment of Hussars at Metz, and in the campaign of 1792, when the French Army of the North defeated the allied Prussians and Austrians, he showed himself far above the average in energy and valour. In 1804, when the French Empire was proclaimed,

Napoleon made him Marshal of France. Ney defeated the Austrians at Elchingen in 1805 (receiving for this exploit the title Duke of Elchingen in 1808), took part in the battles of Jena and Eylau, and in 1807 helped in the victory of Friedland over the Russians.

For his services in the disastrous Russian campaign, he was awarded the title Prince of the Moskova; he proved himself invaluable during the terrible Retreat from Moscow. Ney approved Napoleon's abdication, and was quite outspoken in his devotion to the Bourbons. They made him a Peer of France, and a member of the council of war. When he heard of the return of Napoleon he assured Louis XVIII of his fidelity, but on 13th March, Ney deserted with his troops.

It was Ney who led the last charge of the Old Guard on the field of Waterloo. When all was lost, he attempted to be on the right side at the right time by returning to Paris and advocating the recall of the Bourbons. But his advances were ignored, and he was captured and put on trial by a court martial. Public opinion favoured his acquittal, but he was shot for treason.

NIAGARA FALLS AND RIVER. The Niagara River connects Lake Erie and Lake

Ontario in North America, and forms the outlet for the drainage of all the Great Lakes except Lake Ontario. It is navigable throughout most of its length of 35 miles, the principal exception being the 9 miles occupied by the famous series of rapids and the Falls.

Along the plateau which it traverses from Lake Erie, the river flows tranquilly between level banks, being at its source 326 ft. higher than Lake Ontario.

Near the lower edge of the plateau, its waters divide to pass on either side of Grand Island, and a little distance beyond the point where they reunite, the channel swiftly narrows, and the river enters upon a series of rapids. Down these rapids the waters race to send a mass of 500,000 tons a minute into the gorge. Goat Island separates the river into two unequal streams just above the Falls—the greater forming the magnificent Horseshoe Falls on the Canadian side, and the lesser cataract, on the east shore, forming the American Falls. The Horseshoe Falls have a length of 2950 ft. along the crest, or 1230 ft. across the chord of the circle. This main cataract carries over 90 per cent of the entire volume of water and has a fall of 158 ft. The American Falls are 1400 ft. along the curve, and have a drop of 167 ft.

The gorge is scarcely less splendid than the Falls themselves. It stretches for a distance of seven miles. There is an aerial cableway reaching from Colt's Point to Thompson's Point on the opposite bank.

The first plant erected to utilize the power of the Falls was built in 1853. But not until the dynamo became commercially practical was electricity developed extensively for industrial uses. There are now large power plants on both sides of the river, which are said to have appreciably reduced the volume of the Falls.

NIBELUNGENLIED, *ne' bë loong en leet*. A German epic, dating probably from the twelfth or thirteenth century. The name of the author is not known, nor whether the action is founded on historical happenings.

The story tells how Siegfried, king of the Nibelungs, the possessor of the wonderful Nibelung treasure, marries Kriemhild, sister of King Gunther of Burgundy. Gunther wishes to wed Brunhilda of Iceland, who is to be won only by the man who can overcome her in combat, and Siegfried, donning a magic cloak, wins her for Gunther. Years later, when a dispute as to the relative dignity of the two kings arises, Kriemhild taunts Brunhilda with having been won by Siegfried instead of by Gunther, and the Icelandic princess induces Hagen, one of Gunther's vassals, to put Siegfried to death.

Kriemhild later marries Etzel, king of the Huns, but she never gives up her thoughts of vengeance, and in pursuance of her plan, invites Gunther with his wife and followers to visit her at her husband's court. The Huns fall upon the visiting Burgundians and put them to death, Kriemhild slaying Gunther and Hagen with her own hand. The treasure

The second council was called by the Empress Irene and Constantine, her son, as a result of the opposition to the decree of the Emperor Leo, her deceased husband, that the use of images be forbidden for any purpose. The Empress revoked this decree. See ICONOCLASTS.

Nicene Creed. This summary of the chief



NIAGARA FALLS

The Horseshoe Falls on the Canadian side are to the right.

Photo: Sport and General

of the Nibelungs is supposed to lie at the bottom of the Rhine, having been sunk by Hagen before he set out.

The awakening of the national spirit in Germany in the nineteenth century aroused interest in the legend. *The Ring of the Nibelung*, by Richard Wagner, is based on the story. See MYTHOLOGY.

NICAEA, nī se' a, COUNCILS OF. Two councils of the Christian Church were held at Nicaea, in Bithynia, Asia Minor, in 325 and 786. The first was convened by the Emperor Constantine, chiefly to discuss the Arian views of the Trinity. These views, held and advocated by Arius of Alexandria, were that Christ is not of the same essence as God, but only of like essence. The outcome of the controversy was the adoption of the Nicene Creed, affirming that God and Christ are of one substance (see below).

articles of the Christian faith was adopted originally in the following form --

"We believe in one God, the Father Almighty, maker of all things, both visible and invisible; and in one Lord, Jesus Christ the Son of God, begotten of the Father, only begotten, that is to say, of the substance of the Father, God of God and Light of Light, very God of very God, begotten, not made, being of one substance with the Father, by whom all things were made, both things in heaven and things on earth; who, for us men and for our salvation, came down and was made flesh, made man, suffered, and rose again on the third day, went up into the heavens, and is to come again to judge both the quick and the dead; and in the Holy Ghost."

The Nicene Creed is next oldest to the Apostles' Creed.

NICARAGUA. The largest republic of Central America; has an area of 51,660 sq miles, and a population of 750,000 (1930).

Nicaragua is said to have been named after an Indian chief named Nicarao, or Nicaragua, who was at one time powerful in the country.

The mountain barrier running through the centre of the country divides the population into two distinct groups.

The people of the eastern half are chiefly Mosquito and Zambos Indians and negroes, with few people of Spanish descent. Most of them are inactive, working only when absolutely necessary. The western half of the country supports about 75 per cent of the population, although there are many Indians, most of the people are of mixed Spanish and Indian blood and show greater industry and progress.

There are few elementary schools, a few secondary and normal schools, and three universities, but much yet remains to be done in the field of education. About 60 per cent of the population is illiterate. Corrupt forms of Spanish and English are spoken.

Cities and Towns. More than in any other country of Central America, Nicaraguans are city dwellers, and rivalry between towns has been the cause of much bloodshed. Corinto and San Juan del Sur are the chief seaports on the Pacific. San Juan del Norte, sometimes called Greytown, is a small town and port on the Atlantic coast.

Bluefields, a seaport on the Mosquito Coast, has a landlocked harbour. Large quantities of bananas and other tropical

fruits are exported. From 1655 to 1850, Bluefields and the surrounding territory formed a British protectorate, governed by a native Indian chief; but in 1894 the district was incorporated with Nicaragua. Population, 4706.

Granada, a port on Lake Nicaragua, has a population of 18,066 people, and is the most

important commercial centre of the republic. It is one of the oldest cities of the continent.

León, formerly the capital, lies about thirteen miles from the Pacific coast. Its cathedral and the College of San Roman, founded in 1523, are among the finest structures in Central America. Population about 35,000.

MANAGUA, a city of 45,000 people, on the southern border of the lake of the same name, has been the capital since 1855. It lies in a fertile district, surrounded by volcanic cones.

The Land and Resources. The central highland belt slopes gently eastward to a broad coastal plain fringing the Caribbean Sea. The climate here



NICARAGUA

A street in the business quarter (above) and riverside native dwellings.

Photos U & L

is tropical, with abundant rainfall, and there are valuable forests, furnishing mahogany, cedar, dyewoods, gums, and medicinal plants for export. The banks of the Escondido River are lined with banana plantations. Coconuts, plantains, oranges, pineapples, and yuccas are also grown. In the mountainous region lies a great fertile basin, 300 miles long and 100 miles wide. This is the most temperate zone of the country, and it is cooler and drier than the coasts; here most of the industries and population are centred. In this plain lie Lake Nicaragua, with an area of over 3000 sq. miles, and Lake Managua.

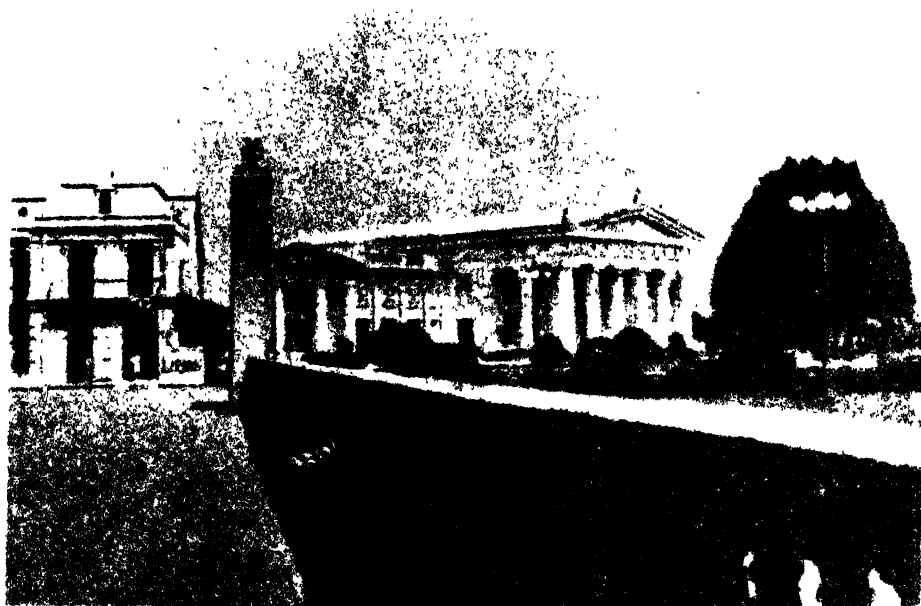
The Pacific slope is steep and narrow, and along the coast is a low chain of volcanic cones.

The western half of the country produces most of its own food, and coffee, sugar cane, cacao, maize and beans are articles of export. Rubber is collected in the forests. The high plains afford support for many cattle, and hides are exported.

Gold, copper, silver, coal, oil, and precious stones are found, but mining shows little

Central American country that has adopted the bicameral principle. The President is elected by direct popular vote for a four-year term. He is assisted by a Cabinet of responsible ministers.

The progress of the country has been retarded by almost constant civil strife, in which ambitious leaders are continually attempting to win election by revolution. Zelaya, who was inaugurated President in 1894 and re-elected for three consecutively,



CITY HALL, MANAGUA

The finest of Nicaragua's government buildings.

Photo: U. & U.

activity, owing to poor transport facilities and lack of labour.

There are few good roads in the country, and communication between the eastern and western sections is difficult. The only railway is the Pacific Railway, connecting with steamers plying on the lakes.

The opening of the Panama Canal has facilitated commerce with the western districts. Two-thirds of the imports are from the United States and 55 per cent of the exports are sent to the United States. The principal exports are coffee, bananas, and mahogany.

Government and History. The legislative function is carried on by a bicameral Congress, consisting of a Senate of twenty-four members, elected for six years, and a Chamber of Deputies of forty-three members, elected for four years. Nicaragua is the only

terms, held office longer and more peaceably than any of his successors, but in spite of his progressive policy he was a brutal despot, and his long continuance in power caused great discontent. Foreign relations were also strained, and when, in 1909, a revolution broke out, Zelaya was forced to flee. Revolutions continued, and in 1912 the United States was forced to land marines to protect her nationals.

In 1916 a treaty between the United States and Nicaragua secured to the United States exclusive right to construct an interoceanic canal across Nicaraguan territory, right to use the Gulf of Fonseca on the Pacific as a naval base, and substantial control of finances and foreign relations.

In 1917 Nicaragua declared war on Germany, but took no active part in the World War.

A long period of political unrest and risings punctuated by United States intervention did not end until 1928, and American marines remained in the country until 1933. The last revolution was in 1935. Nicaragua left the League of Nations in 1936.

NICE, *nees*. See **FRANCE**.

NICENE, *ni'seen*, **CREED**. See **NICAEA**.

NICHOLAS. The name of five Popes, of whom three are important in history.

Nicholas I (d. 867). Nicholas "the Great" became Pope in 858. His excommunication of Photius, Patriarch of Constantinople, widened the breach between the Eastern and Western Churches. He refused to allow the divorce of Lorraine to his wife, and he asserted the right of bishops to appeal to Rome against their metropolitans.

Nicholas II (d. 1061). Gerard, Bishop of Florence, became Pope in 1058; he made alliance with the Normans in Southern Italy, disregarded various Imperialist claims, and continued a policy of reform. He also

secured the dominance of Rome over the Church of Milan.

Nicholas V (d. 1455). A kindly, honourable scholar, became Pope in 1447. He found Rome reduced to submission by the severe methods of his predecessor, Eugenius IV, and a feeble attempt at Republican power, led by Porcario, hardly disturbed his supremacy in the city. In 1449 the anti-pope Felix I abdicated and the Council of Basel dissolved itself, leaving Nicholas free to play the humanist and to begin the rebuilding of Rome.

NICHOLAS I (Montenegro). See **MONTENEGRO**.

Nicholas I, **TSAR OF RUSSIA**. See **ROMANOFF**, **HOUSE OF**.

Nicholas II (1868-1918), **TSAR OF RUSSIA**. His upbringing in no way fitted him for his responsibilities. The Empress Alexandra, herself under the influence of various religious quacks, had considerable influence over the Tsar. After his succession in 1894



THE RUSSIAN IMPERIAL FAMILY
 Photograph taken after the enforced abdication of Tsar Nicholas II
 Photo: Brown Bros.

requests for a less autocratic form of government were categorically refused and from that moment began a struggle between the Tsar and his people with a steady growth of the revolutionary movement. Though ardently desiring peace, Nicholas led his country into two wars--the Japanese and the World War. When in March, 1917, the Russian Revolution broke out, the Tsar was forced to abdicate. He sought the removal of himself and his family to England, but was arrested and later, with his wife and children, executed.

NICHOLAS, GRAND DUKE OF RUSSIA (1856-1929). Nikolai Nikolaievich, a grandson of Tsar Nicholas I, was trained from youth as a soldier, and was on his father's staff in the Turkish war of 1877. He rose to high military command in the following year, and from 1906 to 1914 he was in command of the St. Petersburg area. In 1914 he was appointed Commander-in-Chief. He showed real strategical genius, but his task was rendered hopeless by the lack of munitions. In 1915 the Tsar took over supreme command and the Grand Duke was sent to the Caucasian front, where he prevented the overwhelming of Persia and occupied Armenia. The revolution of 1917 caused him to retire to the Crimea and then to France.

NICHOLAS, SAINT (d. about 326). According to tradition, he was born at Patara, in Lycia, and became bishop of Myra. He is supposed to have worked many miracles.

The day of his death, 6th December, was long celebrated with special observances in most countries of Europe. Especially was

St. Nicholas the patron of travellers by land and by sea, of scholars, and of the young. The Dutch, shortening his name, made of him "Santa Claus," and thus he is most commonly known.

NICHOLSON, JOHN (1821-1857). British soldier, born in Dublin. He entered the Indian army at the age of eighteen and gave distinguished service in the Afghan War (1842) and the Second Sikh War (1849). On the outbreak of the Indian Mutiny he commanded the force which went to the relief of Delhi. While leading the main assault on the walls he received the bullet wound which cut short his brilliant career at thirty-six.

NICIAS, nik'ias (died 413 B.C.). An Athenian general and statesman, prominent during the Peloponnesian War (which see). His dominating characteristic was caution, which he carried to such extremes as to make his name a byword. In the war against the Spartans, he won several victories, captured Minoa and Cythera, and in 421 B.C. concluded with Sparta the so-called Peace of Nicias, ending the first phase of the war.

In 415 B.C. the war policy of Alcibiades led to the expedition against Sicily, and Nicias was made one of the leaders. Alcibiades was soon recalled, and Nicias as chief commander proved himself unequal to so great a task. The siege of Syracuse ended in disaster to the besieging party, and upon surrender, Nicias was put to death. The Sicelids were one of his strong admirers.

NICKEL. A hard white metal with a slight yellow tint, nearly nine times as heavy as water. It is highly magnetic and malleable.



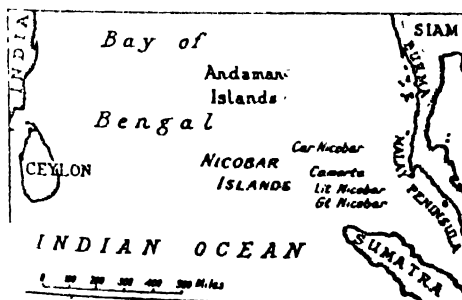
A PURE NICKEL VESSEL OF 3000 LITRES CAPACITY, MADE BY THE BERNDORF METAL WORKS

takes a fine polish, resists many chemicals, and does not readily tarnish or rust. Mainly because of these properties, nickel is extensively used in structural work, in electro-plating, and in the manufacture of numerous metallic articles. It makes an admirable coating for metals that are more easily affected by exposure to air. Nickel resists the action of alkaline and most acid solutions, and is much used for laboratory crucibles. It is dissolved, however, by nitric acid.

One of the most important uses for nickel is as a "catalyst" for hydrogenation reactions, for which it is used in a finely-divided form. This chemical activity was discovered by the French chemist, Sabatier. In industry, by far the largest amount of nickel is used in making *nickel steel*, an alloy that resists corrosion, withstands strain, and is extremely hard, though very elastic. It goes into armour plate, motor-car axles, engine forgings and various kinds of structural work. *German silver*, a metal from which table-ware is frequently made, is an alloy of nickel, copper and zinc. *Nickeloy* is an alloy of aluminum, nickel and copper.

The chief source of nickel is an ore called *pentlandite*, a mixture of the metal with copper and iron sulphides. About half of the world's supply is produced in Ontario, Canada. New Caledonia, an island in the South Pacific, also has productive fields of nickel, and smaller amounts come from Tasmania. Its chemical symbol is *Ni*.

NICOBAR ISLANDS. Situated in the Bay of Bengal, about 600 miles south of Borneo, these are a group of 29 British islands, nine being uninhabited, covering a land area



of 635 sq. miles, of which Great Nicobar, the largest, occupies more than half. Several of the islands are lofty, but others are low-lying, and all contain a good deal of level land. Forests cover most of the surface. The climate is warm and damp. Nankauri Harbour is a land-locked roadstead. The population in 1931 totalled 10,240, of whom all but 106 Chinese and a few Europeans were Nicobarese, a race with Malay affin-

ities. The principal occupation is growing coconuts and producing copra for export, there is also a little export of rattans and *bêche-de-mer*. Trade is chiefly with Penang. The first Europeans to visit the Nicobars were the Portuguese in the fifteenth and sixteenth centuries. In 1869 the British Government took possession and established an Indian penal settlement. This was closed in 1888. Car Nicobar is now the seat of an assistant commissioner under the Commissioner of the Andaman Islands.

NICOL PRISM. See POLARIZATION OF LIGHT.

NICOMEDES, *ník o me' deez*. A king of Bithynia. See GALATIA.

NICOSIA. The capital of Cyprus, and the



TOBACCO PLANT
Photo: Sutton & Sons

centre of business and administration, situated in the north central part of the island. The chief industries are tanning and hand weaving. Two aqueducts carry the town's water supply. The original name, *Ledra*, was changed to *Leucotheon* (corrupted in the medieval Greek to *Leucosia* and Frankish *Nicosia*) about 280 B.C. Population (1931), 23,507.

NICOTIANA OR TOBACCO PLANT. A flower frequently cultivated in gardens and greenhouses. The most popular species grown in England is *N. affinis*, also known as *N. glauca*, which is raised from seed either in a greenhouse or a hotbed. The flowers are white and star-shaped, with a sweet perfume which grows stronger at night when the flower closes.

Scientific Names. Other varieties are: *Nicotiana glauca* (the tobacco plant of commerce), *N. glauca* (large leaves) and *N. sandrae* (pink flowers).

NICOTINE. Colourless vegetable alkaloid, with a hot and bitter taste, found in small quantities in the leaves, roots and seeds of the tobacco plant, of which it is the most active principle. The quantity of nicotine in nearly all tobacco ranges from 2 per cent to 2.8 per cent of its composition. It is practically absent from Turkish tobacco; in the western hemisphere it is found least in good Havana tobacco, where the percentage is .6, and is most abundant in cheaper varieties. In Virginian it amounts to 1.6.

Nicotine is exceedingly poisonous, and in a pure state even a very small quantity is dangerous. See TOBACCO.

Chemical Formula. The formula for nicotine is $C_{10}H_{14}N_2$; that is, a molecule contains 10 atoms of carbon, 14 of hydrogen, and 2 of nitrogen.

NICHEROY, *ník le roy'*. A city of Brazil (which see).

NICTITATING MEMBRANE. The extra eyelid of a bird. See BIRD.

NIDAROS. Name used Trondheim, Norway, January, 1930, to March, 1931. See NORWAY.

NIELLO, *ne el' o*. A method of ornamenting silver and gold plates by using a black composition to fill up and intensify the lines of the design cut into the metal. The surface of the engraving is then smoothed down and burnished. Traces of this art are found in ancient Roman work, and it was popular in the Byzantine Empire from the sixth century onward, when sacred vessels belonging to the Christian ritual were ornamented by this process. The art is still practised by the metal-workers of India and Russia.

NIEPCE, JOSEPH NICEPHORE (1765-1833). French physicist. After serving in the army he was administrator of the district of Nice from 1795 to 1801 and then, in conjunction with his brother, started mechanical and chemical researches. In 1827 he produced a photograph on a metal plate. Later he joined forces with Daguerre.

NIETZSCHE, *ne' ché*, FRIEDRICH WILHELM (1844-1900). A German philosopher who denounced the Christian faith, refused to accept what are generally termed the Christian virtues, and made of the Superman (*Uebermensch*) his ideal, who should trample underfoot the lowly and weak-spirited. He revolted against modern ideas of democracy and assailed State supremacy. The "will to power" was his guiding principle; the moral man must live only for self. Attacking all accepted principles of ethics, Nietzsche's thinking developed into a revolt against all conventions. His claim to renown rests not only on his philosophy, but also on the brilliance of his epigrams and the fascination of his style.

He was born near Lützen, and educated principally at the Universities of Bonn and

Leipzig. In 1869 he was made Professor of Classical Philology in the University of Basel. Some years later, serious eye and nervous trouble forced him to retire on a pension; in 1888 he became insane. His friendship with Wagner ended with his denunciation of Wagner's music as decadent. In later years, Nietzsche scorned his teacher, Schopenhauer, although he owed much to his master's philosophy. His principal works include *The Birth of Tragedy*; *Thus Spake Zarathustra*, *The Twilight of the Idols*; *The Will to Power*; *The Antichrist*; and his *Poems*.

NIFLHEIM, *neev' l hayn*. In Norse mythology, a region of everlasting cold and darkness, the abode of Hel, the goddess of death. Niflheim was situated under one of the roots of Yggdrasil, the mystic ash tree. Not only the wicked were cast into this cheerless place, but all those who died of sickness or old age. Consequently, many took their own lives in order to save themselves this fate.

NIGELLA, *nī jel' la*. See LOVE IN A MIST.

NIGERIA, *nī je' ria*. British colony and protectorate in tropical West Africa, with an area of 372,674 sq. miles (Northern Provinces, 281,778 sq. miles; and Southern Pro-



NATIVE HUT IN NIGERIA
Photo. U. & U.

vinces, 80,515 sq. miles). The British mandated territory of the Cameroons (formerly German) is attached for administration.

The low coast is fringed by swamps, lagoons and the wide delta of the Niger. Behind it, low densely-forested plains extend inland until the land rises to the plateau that covers most of the country. This is cut by the wide valleys of the Niger and the Benue. The plateau, in contrast to the alluvial plains and valley floors, is part of the old area of hard rock that covers most of Africa. The Niger and its tributary the Benue are the chief rivers, and are navigable in the rainy season to Jebba and Yola

respectively. Above the Busa rapids, the Niger is again navigable. The delta prevents large vessels using the river. Lake Chad touches the Northern Provinces in the extreme north-east.

The climate is warm, with cooler conditions in the north in winter. On the coast and plains, rainfall is heavy, with a dry season only from November to January. In the north the dry season is much longer.

Peoples. Nigeria is one of the most densely populated parts of negro Africa.

The total population is nearly 20,000,000. In the south are negro races, principally Yoruba; in the north the Fulah and Hausa show Arab mixture, and there Mohammedanism replaces the paganism of the south. The negroes have some tribal organization, but the tribes of the north have long had civilized governments on Arab lines. The European population of about

500 consists of officials, missionaries and traders. In the Northern Provinces, education and much of the administration is in the hands of the native governments. In the south, mission and government schools provide what education there is.

Products and Trade. The natives cultivate maize, yams, cassava, bananas and other crops for their own use. For commercial purposes the most important productions are palm kernels and palm oil, in which Nigeria leads. Cocoa and kola and ground nuts are of increasing importance. Cotton cultivation is spreading over a large area. Hides and skins in great numbers are exported from the Northern Provinces.

The chief minerals are coal and tin. At Udi is the only important coalfield in West Africa. It is connected by rail with Port Harcourt, and has an annual output of about 300,000 tons. Tin ore is mined in the Bauchi plateau.

The most valuable imports are cotton goods, while palm kernels, palm oil and ground-nuts are the chief exports. Trade is chiefly with the United Kingdom.

There are about 1900 miles of railways

and a considerable length of motor roads, for motor transport is of growing use.

Towns. LAGOS (population 126,000) is the administrative capital and chief port, with a much improved harbour. It constitutes the colony, as apart from the protectorate. Port Harcourt is second in importance. Victoria is the port for the Cameroon territory. The inland towns are larger and older. Ibadan, with a population of 387,000, is said to be the largest city in tropical Africa. In the north the chief town is KANO (population

90,000), which is a centre of the Hausa civilization, and a considerable market and centre of cotton-weaving.

History and Administration.

The exploration of the Niger River was begun by Mungo Park in 1795 and 1805, and continued by Clapperton, Lander and others; but not until 1861 was Lagos ceded to Great Britain. From 1874 to 1886 it formed part of the Gold Coast



WITCH DOCTORS IN NIGERIA PERFORMING THE HOE DANCE

This dance is to propitiate the spirits who will help the seed to grow.

Colony. The Niger Valley came under the newly formed African Company, then under the Niger Company in 1884. The Oil Rivers Protectorate of 1885 became the Niger Coast Protectorate in 1893. In 1900, on the surrender of territorial rights by the Royal Niger Company, its lands became the Protectorates of Northern and Southern Nigeria. In 1914 the two were united in the Colony and Protectorate of Nigeria. There is a Governor over the whole and two Lieutenant-Governors, one for each protectorate. There is an executive council of senior officials and a legislative council, partly elected, for the Southern Protectorate. Laws for the Northern Protectorate are enacted by the Governor. In many of the districts, local administration is left in the hands of the native chiefs.

NIGER, ni'jer, RIVER (OR JOLIBA). The third largest river of Africa, ranking next to the Congo and the Nile. Though there are obstructions in many places, the Niger is the only river on the continent affording to light-draught ships a watercourse free from rapids, communicating with the interior. The Benue, its chief tributary, joins the

larger stream 250 miles from the mouth, and has itself a stretch of 600 miles which is navigable four or five months of the year, in the season of high water. The Niger rises in West Africa, only 150 miles from the Atlantic coast, and flows in a tortuous course for about 2600 miles before reaching its outlet on the Gulf of Guinea. It is connected with the Senegal and the Guinea coast by railway. Its total drainage basin covers an area of 584,000 sq. miles. The territory traversed by the Benue and the permanently navigable portion of the main stream is under British control, while the upper courses flow through French possessions. The delta, which extends about 100 miles inland, is the largest in Africa, and covers an area of 14,000 sq. miles. Of the numerous arms of the delta, the Nun is the only one used by sea-going vessels.

NIGHTINGALE. A bird of the thrush family, plain in appearance and shy in habits, but with a song of beautiful tone, often heard at night.

The nightingale is a bird of Western and Central Europe. It is about 6 in. long, and

spending its winters in Africa and Southern Europe.

Scientific Name. The nightingale belongs to the family *Turdulac*. Its scientific name is *Luscinia megarhynchos*.

NIGHTINGALE, FLORENCE (1820-1910) English philanthropist and social worker, well known for her reform of nursing

"The Lady with the Lamp," as she later came to be known, was born at Florence. Her childhood was spent chiefly in Derbyshire, where she was privately educated. She very early showed her wish to help the unfortunate. Her social position was high, but she showed little liking for the round of pleasure.

While travelling abroad with her family, she found an opportunity to take a nurses' training course in the Institute of Protestant Deaconesses at Kaiserwerth, Germany. Here she mastered the details of nursing and of hospital management. Finally, she studied in both Paris and Rome. On her return to England in 1853, she became superintendent of a hospital for governesses.

In 1854 tales of the suffering of British soldiers in the Crimean War began to reach England. She wrote to the British War Secretary, offering her services as a nurse, and on 24th October, 1854, left London with a staff of thirty-seven trained assistants and a shipload of hospital supplies. She reached Scutari in time to be of service to the great number of wounded from the Battle of Balaklava. See **CRIMEAN WAR**.

Miss Nightingale was soon given entire charge of the hospital service for the British troops in the field, and worked so unceasingly that, in the summer of 1856, her health broke down and she never fully recovered. She used the proceeds of a presentation fund to found the Nightingale Home for Nurses at St. Thomas's Hospital in London. She supervised the planning of hospitals in Great Britain and other European countries, and acted as expert adviser to the United States during the War of Secession. Her numerous articles and books on nursing occasioned great popular interest in the subject. *Notes*



FLORENCE NIGHTINGALE
Photo: Brown Bros



NIGHTINGALE
Photo: John Kearton

has upper parts of a russet-brown colour, changing to reddish on the rump and tail; the under parts are whitish. It is most at home in secluded woodlands, especially along streams. It lives entirely upon insects, which it catches on the ground.

The nightingale rears but one brood in a season, building its nest near the ground in hedges or thickets. The eggs, from four to six in number, are a deep olive-brown, unspotted. The bird is migratory.

on *Nursing*, published in 1858, had a large circulation.

NIGHTJAR. A family of moth-catching, owl-like birds. The alternative name, "goat-sucker," was given from an ancient belief that these birds milk goats. The more appropriate name is derived from their night-flying habits and jarring cries.

Nightjars reach a length of 11 in., and the soft plumage is in all shades of grey and brown, mottled with white. Members of this family are found almost everywhere, but are most numerous in the tropics. Other general characteristics of the family are the short, thick head, large, gaping mouth, and very small tail with bristles at the base. These birds catch their food while flying, their wings, considering the size of the bird, are long and powerful. They sleep throughout the brightest hours of the day.

Scientific Name. The scientific name of the goat-sucker family is *Caprimulgidae*. The common nightjar of the Old World is *Caprimulgus europaeus*.

NIGHTMARE. The name given to dreams involving a feeling of oppression, inability to move or speak, overwhelming fear, etc. Nightmare is usually caused by digestive disturbance, but may arise from disorders of

the circulation or breathing processes. Prolonged mental stress or overwork may cause it in nervous people.

Derivation. The word *nightmare* has an interesting derivation. The term *mare* was originally applied to



NIGHTJAR ON NEST

Photo: Cherry Kearton

an evil spirit that oppressed people at night, and the Anglo-Saxon root from which it is derived means "incubus," or demon.

NIGHTSHADE. The deadly nightshade is a stout herbaceous plant, with large leaves, and grows up to 4 ft. in height. The flowers are vivid purple, bell-shaped and drooping, growing from the axils of the upper leaves. It bears black berries, rather similar in appearance to cherries, but they can be distinguished by the outer case, or flower sepals, at their base. The plant and the leaves are both highly poisonous. It is a perennial, flowing from June to August, but is only rarely found wild in England. Woody nightshade climbs to 10 ft. and is common in hedges and thickets. It bears small purple and yellow drooping flowers in June and July, these being followed by red berries. The black nightshade bears white flowers with yellow anthers, followed by black berries. Common enchanter's nightshade, bearing small white flowers, is often a troublesome weed, and the alpine enchanter's nightshade is frequently found wild in mountainous areas.

Scientific Names. Deadly nightshade, *Atropa Bella donna*; woody nightshade, *Solanum dulcamara*; black nightshade, *S. nigrum*; enchanter's nightshade, *Circaea lutidiana*; Alpine enchanter's nightshade, *C. alpina*.

NIHILISTS AND NIHILISM, *nī' hīl ists, nī' hīl iz'm.* The names given by the Russian writer Turgeneff (about 1860) to the social agitators of his day and the doctrines taught



ENCHANTER'S NIGHTSHADE

Photo: E. J. Hocking

by them, for they wished to overthrow society as it then existed and reorganize it in accordance with their theories.

At first, Nihilism was a philosophical and literary movement. In religion it was, in the exact sense, atheistic; in science, it supported evolution and the newer teachings of the day; in social affairs, it taught the complete equality of the sexes; in government, it insisted on the necessity of thoroughgoing changes in every department.

About the year 1874, the Government of Russia began a determined effort to crush the movement. Thousands of people were arrested. Prison life was made so unbearable that scores of those in prison committed suicide before their cases came to trial.

Establishment of a form of constitutional government through the Duma (which see) weakened the influence of Nihilism.

Derivation. The name is from the Latin *nihil*, "nothing," the implication being that the social organization had to be rebuilt entirely.

NIKE APTEROS, *nî'ke ap'te'ros*, TEMPLE OF. The smallest building on the Acropolis of Athens (see ACROPOLIS). It has a single room, in which there formerly stood a statue of Athene, made in her honour as giver of victory. Athene was always represented without wings, but Nike, the goddess of victory, is always shown bearing them; hence this temple, dedicated to the Athene of victory, is called the Temple of "the victory-without-wings," or *Nike Apteros*. It stood almost as it had been built in the time of Pericles until about 1687, when it was torn down by the Turks. In 1835 it was restored.

NILE, BATTLE OF THE. See NELSON OF THE NILE; NAPOLEON I.

NILE, RIVER. The longest river of Africa, and the most important, since on it depends the fertility of Egypt.

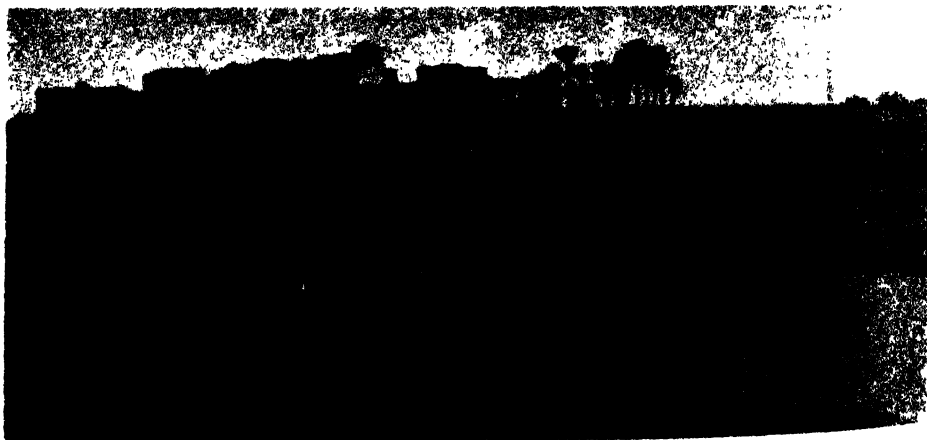
For many centuries nothing was known of the source of the Nile, except that it was far to the south. The ancient Egyptians and the Romans were stopped in their passage up the river by masses of floating vegetation called *sudd*, and though Ptolemy's theory of the origin of the stream was well



SCULPTURE REPRESENTING "FATHER NILE"
(Vatican, Rome.)

founded, only explorations between 1862 and 1884 revealed the actual truth. The Nile is the only river in the world which rises at the Equator and flows into a temperate zone. Starting in Ruwenzori, or the Mountains of the Moon, the two branches enter Lakes Victoria and Albert respectively, and then unite to flow north for nearly 4000 miles.

The river then receives a many-tributated stream from the Congo watershed, after which it is called the White Nile, until at Khartoum it is joined by the Blue Nile from Ethiopia. Through the desert its basin becomes narrower, and near Cairo it is less than 100 yds. wide. For the last 1600 miles it has no tributaries; in places the desert



VILLAGE IN THE UPPER NILE VALLEY
Photo: Keystone



KODOK ON THE UPPER NILE

Photo: Egyptian Tourist Development Association

comes close to its banks, in others there are high cliffs. At Cairo the delta begins

The region mainly benefited by the annual flood is below Aswan, where the great dam has been built. The flood begins in June and reaches its height in September, for the flood waters come from the Ethiopian highlands, where the heavy rains occur in summer. Other barrages are at Assiut and Sennar (Blue Nile).

Except for six rapids called cataracts, which are between Khartoum and Aswan, the Nile is navigable beyond Mongalla in Anglo-Egyptian Sudan.

NILOTE, *ni' lot*. Name given the negroes of the Upper Nile valley, an unusually tall people with admixture of Hamitic blood.

NIMBUS. In painting, a HALO, first used in Christian art in the fifth century. About the heads of very ancient statues representing gods there were often circles of stars. The Roman emperors sometimes wore such ornaments to indicate their equality with the gods. Christians did not use the halo in their earliest art, because of its associations. Later, bands of brass were put round the heads of statuary placed out-of-doors, to prevent the wearing effect of rain and snow. From this custom came the use by

artists of a circle of light painted above the heads of sacred or divine persons.

NIMBUS. A kind of cloud (which see).

NIMES, *neem*. See FRANCE.

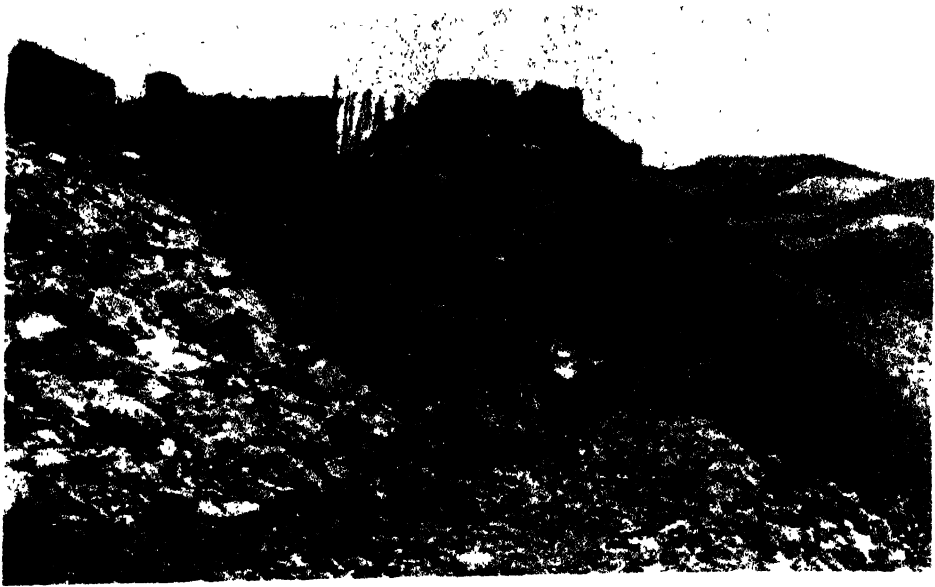
NIMROD. A Bible character of the time of the scattering of peoples, some centuries after the Flood. He was a grandson of Ham and the son of Cush. Originally, he ruled



TYPES OF NIMBUS

the cities of Babel, Erech, Akkad and Calneh in the Land of Shinar, or Babylon, and was credited with the founding of Nineveh. He was known as "a mighty hunter before the Lord."

NIN'VEEH. A city of ancient Assyria. See ASSYRIA.



RUIN OF NIMROD'S CASTLE (TRADITIONAL)

It is at Kalaat el-Nimrod in Syria, near Baniyas (Pneas). In Roman times there was a great temple to Pan here. The site is near the ancient city of Damascus.

Photo: ORO

NING-PO', OR CITY OF THE PEACEFUL WAVES—A walled city of China, one of the five ports opened to foreign commerce by



NIOBE

Uffizi Gallery, Florence.

Photo: Visual Education Service

the Treaty of Nanking (1842). It is situated on the east coast of the province of Chekiang, 16 miles inland on the River Ning-po.

The city was settled by the Portuguese in 1522, but twenty-three years later they were driven out after a massacre. The British occupied the town for six months (1841-1842), after which it was opened to foreign trade. Tea, cotton, silk and carpets are important articles of export. Ning-po is primarily a distributing point for the goods of Shanghai. Population, 300,000.

NIOBE, *nī' o be*. According to the Greek myth, the daughter of Tantalus and wife of Amphion, king of Thebes. She had six sons and six daughters, but her pride led her to insult Leto (Latona), mother of Apollo and Artemis, by claiming that, as the mother of so numerous a family, she was more entitled to worship than the goddess. The latter revenged herself, for all the sons of Niobe perished by the arrows of Apollo, and Diana slew every one of the daughters except Chloris, who married King Neleus of Pylos. So great was the grief of Niobe that the gods in pity turned her into stone on Mount Sipylus.

NIPPON, *nip' pon'*. The Japanese name for Japan.

NIRVANA, *neer vah' na*. See **BUDDHISM**.

NIT. The egg of a louse (which see).

NITRATE OF SILVER. See **LUNAR CAUSTIC**.

NITRATES. Salts of nitric acid. They always contain nitrogen and oxygen in combination with some other element. Thus, sodium nitrate (Chile saltpetre) is a compound of sodium, nitrogen and oxygen; silver nitrate (lunar caustic) contains silver, nitrogen and oxygen. The various nitrates are widely employed in the arts and in industry, finding use especially in medicine.

Chemical Formula. The formula for nitric acid is HNO_3 ; that is, a molecule contains 1 atom of hydrogen, 1 of nitrogen, and 3 atoms of oxygen.

NITROBENZENE'. See BENZENE; ANILINE.

NITROCELLULOSE, *nī tro sel' ū löse* See CELLULOSE; GUN-COTTON

NITROGEN. A gaseous element, indispensable to the life of plants and animals.



GENERAL VIEW OF A NITRATE PLANT IN CHILE

photography, the manufacture of fireworks and of nitric acid, and as fertilizers.

Large natural deposits of sodium nitrate are found in Chile, and form that country's most valuable export.

NITRE, *nī' ter*. See SALT PETRE.

NITRIC, nī' trik, ACID. The *aqua fortis* of the arts, an important compound of hydrogen, nitrogen and oxygen. In a pure state it is an unstable, colourless fluid, capable of burning organic tissues by chemical action. On exposure to air, it decomposes into lower oxides, and brown fumes of nitrogen peroxide appear. Seventy-six per cent of the acid is oxygen, which is readily given up, making the acid a powerful oxidizing agent. It never occurs in a free state, but is found abundantly in combination with potash, soda, lime and magnesia. With sodium, potassium and other elements it forms soluble salts called nitrates.

Nitric acid is prepared commercially in various ways. The method commonly used consists in treating saltpetre (sodium nitrate) with dilute sulphuric acid, and condensing the resulting vapours.

Nitric acid dissolves all metals except gold, platinum, antimony, aluminium and tin. A mixture of three parts of hydrochloric acid and one part of nitric forms *aqua regia*, which dissolves the foregoing metals. Nitric acid is used in the manufacture of explosives, coal-tar dyes, celluloid and other organic compounds.

Nitrogen comprises about 75 per cent of the air by weight and about 79 per cent by volume. Because it does not combine easily with oxygen or any other element, it serves to dilute the oxygen in the air, preventing a too rapid rate of combustion. Nitrogen is colourless, tasteless and odourless, slightly soluble in water, a little lighter than air, and fourteen times as heavy as hydrogen. Its chemical symbol is *N*.

Nitrogen is found in protoplasm, and is a constituent of all protein foods and of muscle tissue. It is one of the essential plant foods, and is obtained by most plants from soluble nitrogen compounds contained in the soil (see BIOCHEMISTRY). There are some plants, however, the legumes, whose roots bear nodules containing bacteria capable of taking nitrogen from the air. Man and animals obtain their supply of nitrogen by eating plant or animal foods containing this element. In breathing, animals draw in nitrogen as well as oxygen, but only the oxygen unites with the blood. The nitrogen is breathed out again unchanged, and is never added to the body tissue through respiration.

In Nature, soils obtain nitrogen from the atmosphere through the agency of lightning and rain. The electrical action in the air causes a union of oxygen and nitrogen, and forms oxides of nitrogen; these oxides are carried by rain into the soil. This source of nitrogen, however, does not suffice to keep a soil enriched year after year if it is

continuously planted. Farmers renew their fields by rotation of crops, or by using nitrogenous fertilizers. In a crop rotation to secure nitrogen, wheat, corn, or other nitrogen-consuming plant is followed by a nitrogen-restoring plant, such as clover or some other legume.

Nitrogen combined with hydrogen forms ammonia; nitric acid, a constituent of high-power explosives, is a compound of nitrogen, hydrogen and oxygen. There are five oxides of nitrogen. Nitrous oxide is "laughing gas," used as an anaesthetic in dental work; nitric oxide is a carrier of oxygen; nitrogen trioxide, nitrogen peroxide and nitrogen pentoxide are useful oxidizing agents.

NITROGEN LAMP. See ELECTRIC LIGHT.

NITROGLYCERIN, *nī trō glis' er in*. A highly explosive compound, made by simply adding glycerin to a mixture of concentrated nitric and sulphuric acids. A layer of nitroglycerin forms upon the acids in the course of the nitrating process. It is drawn off from the mixture, washed with water, and then with a dilute solution of sodium carbonate. Pure nitroglycerin is a heavy, oily, colourless liquid, but the commercial product is yellow. It is almost insoluble in water, sweet to the taste, and highly poisonous.

When heated to 180° C. (356° F.), nitroglycerin decomposes with explosive violence. It may be exploded by a severe jar, but it is most easily set off with a detonator containing fulminate of mercury. The volume of gas liberated is about 10,000 times the volume of the nitroglycerin. It is never used alone, but is mixed with wood pulp or other porous substance to make dynamite (see DYNAMITE; EXPLOSIVES). In medicine it is employed for the relief of heart strain, asthma, some nervous affections, and in certain forms of Bright's disease.

Chemical Formula. The formula for nitroglycerin is $C_3H_5(NO_3)_3$; that is, a molecule contains 3 atoms of carbon, 5 of hydrogen, and the 3 groups (NO_3) . Each group is made up of 1 atom of nitrogen and 3 of oxygen. The atoms of such a group (called a *radical*) remain associated together in chemical reactions and act as a single atom.

NITROUS OXIDE. True name of the gas called "laughing gas." This is a compound of nitrogen and oxygen, formed by gently heating ammonium nitrate. It is a colourless gas of sweetish taste and odour, heavier than air, and moderately soluble in water. It is usually sold in liquid form, as it is condensed readily to a liquid by pressure. When mixed with air and inhaled, it produces insensibility to pain. As the effects of nitrous oxide are not severe and soon pass off, it is extensively used as an anaesthetic in dental work and minor surgical operations. See ANAESTHETIC.

Chemical Formula. The formula for nitrous oxide is N_2O .

NITTI, FRANCESCO SAVERIO (born 1868) Barrister and professor, Nitti was known as an economic expert before he began his political life in 1904. He was Minister of Agriculture from 1911 to 1914, and Minister of the Treasury from 1917 to 1919, when he succeeded Orlando as Premier. Italy was in a disturbed state, war-weary and inclined to Communism. Nitti did all he could to conciliate the extreme Left, introducing a system of proportional representation which enormously strengthened the Socialist vote. Civil disturbances were frequent and he resigned more than once, but was kept in office by lack of a successor. Indignation at an attempt at State economy forced his final resignation in 1920. He retired abroad on the triumph of the Fascists, whom he had strongly opposed.

NIX. In the folklore of the German people, the name given to a water sprite, either male or female. Like the Greek and Roman water divinities, the nixies were supposed to have the gift of prophecy. They were particularly fond of music and dancing, and sometimes joined in the dance with human beings, but as they were treacherous and often malignant, it was never considered wise to trust them.

NIZHNI NOVGOROD, *nyizh' ne nov' go rot*, now GORKY. See RUSSIA

NOAH. The hero of the story of the Flood as told in Genesis vi-ix. He was chosen by God to preserve life during the Deluge. He built an Ark into which he and his family retired with beasts, creeping things, and fowls, "two and two . . . male and female." After the waters receded and the land had dried, Noah offered a sacrifice on Mount Ararat, where the Ark rested, to which God responded with the promise that the earth should no more be destroyed by a flood. The rainbow was made the visible sign of this covenant.

Noah's sons, Shem, Ham and Japheth, are credited in the Bible with founding the three great races of mankind, the Semitic, the Hamitic and the European races respectively.

NOBEL PRIZES. Five cash prizes annually awarded to persons, regardless of nationality, who have made valuable contributions in a particular field to the "good of humanity," each prize being one of five equal shares of the income from the estate of Alfred Nobel (1833-1896), the Swedish inventor of dynamite. The will of Nobel directed that the interest on his fortune should be divided each year among five persons in the following manner. Award should be made—

1. For the most important discovery or invention in the domain of physics;
2. In chemistry; and
3. In physiology or medicine.
4. For the most distinguished literary work of an idealistic nature.
5. For the most effective work in the interest of international peace.

These prizes have an average value of £10,000 each, and are awarded by several organizations: the prizes for physics and chemistry by the Royal Academy of Science in Stockholm; the prize for medicine by the Caroline Institute, the faculty of medicine in Stockholm; the prize for literature by the Swedish Academy of Literature in Stockholm; the Peace Prize by a committee of five elected by the Norwegian Storting (Parliament). Candidates must be proposed by some person duly qualified, and the proposal must be in writing. Only literary works that have appeared in print are considered. The fund is administered by a board of directors, elected by fifteen deputies appointed by the awarding authorities. The board holds office for two years. Awards are made annually on 10th December.

NOBILE, *no' bil ch*, UMBERTO (born 1885) An Italian aeronautical engineer.

At the outbreak of the World War, Nobile was assigned to the aeronautic construction shops, where he designed and constructed numerous airships for the Italian Navy. In 1919 he was appointed general manager of the Aeronautical Construction Works, Rome.



GENERAL NOBILE
Photo. U. & U.

In 1926 Nobile acted as pilot of the *Norge*, the dirigible which made a successful flight over the North Pole under the command of Roald

Amundsen. In 1928 Nobile was in command of the dirigible *Italia*, which also flew over the North Pole on 24th May.

NOBILITY. The nobility in a particular country constitutes a distinct class, born to the enjoyment of certain privileges, which may be of substantial value or of little material worth, but which are not necessarily political. The foundation on which ancient nobility rested was everywhere the same. Conquest was an important factor in shaping the origin of privileged classes; hence of nobility. Wherever history discloses a mass

of subject people, like the villeins of early Europe generally, or the serfs of Russia under the Tsars, such a people represent tribes reduced to vassalage by conquest, and the conquering tribes constitute a nobility.

But another line of development must be noted. The office of various tribal chieftains—civil and military—in the first stage always elective, tended to pass more and more by inheritance, and hence privileged families were formed which, taken collectively, made up a privileged class, or nobility. The result was that in Europe generally, society existed in three great divisions—the nobility proper, the final development of the numerous chiefs of an earlier period; the freemen, or the mass of conquering tribes; and the bondmen, the subject tribes of early time.

In time, the distinction between the freemen and bondmen disappeared. One of the most interesting researches in history is to trace this development in the different countries. There are now but five groups of nobles in England (see **PEERAGE**). As a class they enjoy the substantial right of seats in the House of Lords, but title and dignity alike pass only to the eldest son, a limitation not known to the primitive conception of nobility in Rome.

NOCTURNE. A short musical composition in tender and romantic style. The name seems to have been first used by the Irish composer John Fields (1782-1837), whose most successful music consists of a set of twenty such pieces, to twelve of which he gave the title of nocturne. These pieces were admired by Chopin, who based on them his own more famous and lasting examples of the form. Broadly speaking, the Nocturne consists of a first section; a second contrasted portion; and a return to the first section with some variation of ornamentation and, perhaps, a brief *coda* or "tail" to finish off.

NODDY. A sea-bird of the tern family (see **TERN**); the name was first used by sailors on account of the birds' stupidity and tameness. There are several species, distributed over the warmer seas of the world. The common nody is sooty in colour, except for grey on the head and a white forehead. It occasionally comes as far north as Britain.

Noddies are distinguished from the terns proper by the fact that in the former the tails are much less forked, or scarcely at all.

Scientific Names. Noddies belong to the family *Sternidae*. The common nody is *Anous stolidus*.

NODE. An astronomical term used to define the points of intersection of any two great circles of the celestial sphere; more particularly, the points at which the orbit

of the moon, or that of any of the planets, as projected on the celestial sphere, intersects the ecliptic, or great circle of the celestial sphere corresponding to the earth's orbit. When the moon passes from the south to the north of the ecliptic, it travels through the *ascending node*, when passing from the north to the south of the ecliptic, it passes through the *descending node*. As the plane of the moon's orbit is constantly changing, the nodes are moving westward, and complete a revolution of the ecliptic in about nineteen years.

NOGI, *no'ge*, MARESUKE, COUNT (1840-1912) A Japanese soldier and general, the hero of the siege of Port Arthur during the Russo-Japanese War of 1904-1905. He was a member of the caste of the Samurai. The siege lasted until January, 1905, and the final ten days' fighting cost the Japanese about 10,000 men. See RUSSO-JAPANESE WAR.

In accordance with time-honoured traditions, both he and his wife committed suicide (*hara-kiri*) during the funeral services of Mutsuhito, their emperor.

NOMAD LIFE. A term derived from the Latin *nomas*, "roaming," and usually applied to primitive peoples without settled homes.

Some of the hunting tribes of the forest regions of equatorial Africa, South America and the East Indies still lead nomad lives. Nomadism is also practised to-day by certain peoples whose livelihood depends upon the raising of horses, sheep and cattle. In Arabia, Mongolia and the desert regions of Central Asia, regions unsuited to agriculture because of climatic conditions, a nomadic life is led. These areas produce grass in sufficient quantity to support large numbers of animals if they are driven from place to place, resulting in the form of

nomadism known as *pastoral*, which was practised by the Hebrews of Bible times. Pastoral nomads are higher in civilization than the hunting tribes mentioned above. See CIVILIZATION.

NOM-DE-PLUME. A name assumed by an author in order to conceal his identity, a pen-name. Although the expression is French, it is not used by the French.

NOMINALISM. The doctrine that general concepts are mere "names," having no corresponding reality. See REALISM.

NON-COMMISSIONED OFFICERS. See ARMY.

NON-CONDUCTOR. See INSULATOR.

NONCONFORMISTS. Name given to those who refuse to conform to the regulation of an established religion. Specifically, the term connotes the Protestant dissenters of England.

They derive their origin from the Puritans of the Reformation, who, adopting the principles of the more extreme Reformers, denied Episcopacy, and objected to certain Church doctrines and ceremonial practices.

NONES. See MONK.

NON-JURORS. Certain High Church bishops and clergy who in 1689 gave up their preferments rather than subscribe to the oath of allegiance to William and Mary. Seven bishops and about four hundred of the lesser clergy followed the lead of Sancroft, Archbishop of Canterbury, in the declaring their conscientious objection to the Act of Settlement, whereby Roman Catholics were excluded from the succession to the throne. Notwithstanding their action, the bulk of the Tories in Church and State accepted the Revolution settlement.

NONSUIT. A legal expression with two distinct meanings, viz. (a) the discontinuance of an action by the plaintiff at some stage



BEDOUINS

Nomads of the North African Desert.

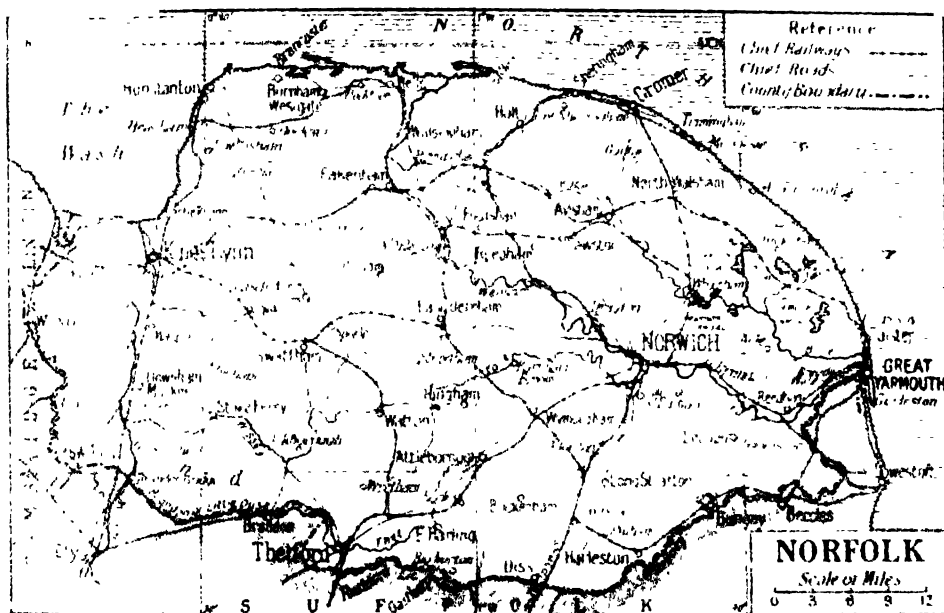
Photo. Cherry Kearton

before judgment is given; and (b) the dismissal of an action by the judge after hearing the plaintiff's argument and evidence, but without hearing the defence, on the ground that the plaintiff on his own showing has no legal ground of complaint against the defendant. The word "nonsuit" is no longer used in High Court practice, but survives in the practice of the County Courts. See PROCEDURE, LEGAL.

NORDENSKJÖLD, *naw ren shurl'*, NILS ADOLPH ERIC, Baron (1832-1901). A Swedish explorer of Finnish descent, the discoverer of

it between Swaffham and East Dereham and extending north-east to the line of cliffs between Cromer and Sheringham. The former is marked by a wide area of heathland which has never been cultivated. The other ridge is less well-defined, and alternates between arable land and woodland.

The whole of the country west of the Ouse falls within the area of Fenland, which has almost all been reclaimed and is now intensively cultivated. In the north-east lie the Norfolk Broads. The largest expanses of water are Hickling Broad, Barton Broad,



the North-east Passage between North America and Asia.

NORDIC. A term used to describe the tall, blonde, dolichocephalic (long-headed) race which in Neolithic times occupied the North German plain. This was a blend of an earlier Palaeolithic people with Mediterranean and Caspian migrants. Many of its characteristics survive in the Teutonic peoples of modern times.

NORFOLK. An easterly county of England, with an area of 1,315,064 acres and a population (1931) of 504,846.

Physical Features. Norfolk contains almost every type of East Anglian scenery, from wide fens to chalk hills and sandy pinelands—and a unique feature in the waterways of the Broads. There are two distinct lines of hills; one forms a broad ridge extending from north of Thetford to the coast at Hunstanton, the other branching from

and Ranworth Broad. They have been formed as a result of the silting up of the combined estuaries of the three rivers, with the consequent slowing and levelling of their streams.

The remainder of the county is gently undulating, and consists of mixed pastoral and arable land.

The coast-line is varied. From Great Yarmouth to Trimmingham it is mainly flat and sandy, but from Trimmingham to Sheringham there are cliffs. West of Sheringham the coast is again level, but near Hunstanton there are abrupt cliffs over 50 ft. in height.

Of the many rivers and streams of the county the largest is the Ouse, which enters the county at Brandon Creek, and flows north into the Wash. Its tributaries are the Brandon or Little Ouse, which forms the southern boundary, the Wissey and the Nar. The Broadland Rivers are the Waveney,

which forms throughout its course the southern boundary, the Yare and the Bure.

Climate. The mean annual rainfall is slightly less than 26 in. The mean temperature is approximately 49 degrees. East winds, prevalent during the early spring

transformed into a flourishing township. There were Roman military camps at Garianonum, the site of which is doubtful, and at Branodunum (Brancaster).

From the departure of the Romans until the later Middle Ages, Norfolk, together with



NORFOLK

1. Castle Acre Priory. 2. Caister Castle. 3. Market House at Wymondham, built in 1616, restored in 1863. 4. Castle Rising. 5. Drainage mill near Horning. 6. Chalk cliffs at Hunstanton. 7. A view on the Broads.

Photos: Frith; Taylor

months, are warmed by their passage across the North Sea.

History. In common with most of East Anglia, Norfolk was a part of the territory of the early British tribe of the Iceni, from which sprang Boadicea. The chief tribal settlement was probably at Caistor St. Edmund, near Norwich, called by the Romans Venta Icenorum, and by them

Suffolk and Essex, formed practically an island within an island, bounded as it was on two sides by the sea, on a third by the Thames and the marshlands which fringed it, and on the fourth by the Fen country, which proved an insuperable barrier. Thus, although the province was exposed to each succeeding horde of invaders from the east, egress was limited; hence the culture of each

invader was assimilated into that of the inhabitants. Saxons, Danes, Normans and Flemings in turn left their impress on the character of the people, and the combined influence of these can still be observed.

By the end of the fifth century, Norfolk was part of the independent kingdom of East Anglia. Christianity was introduced by an East Anglian king, Sigebert. 867 is the

Cromer. In the west of the county a main line from Ely serves Downham Market, King's Lynn, and Hunstanton.

The roads generally are excellent, but in the reclaimed marshlands of the extreme west, and the uplands of the south-west, are not good.

Agriculture and Industries. Norfolk is a flourishing agricultural county, and



CROMER
Photo: L.M.S.

traditional date of a decisive battle near Thetford, after which Norfolk became part of the Danelaw.

The Norman Conquest was achieved with little opposition. From that time until the fourteenth century the chief feature was the steady influx of Flemish weavers, with consequent prosperity. In the rebellion of 1381, King's Lynn and Yarmouth were centres of un-

rest, and Norwich was besieged. The Civil War had but little effect on the county. Since that time there has been a marked decline in the medieval woollen industry, but a corresponding in-

crease in modern industries and improved methods of agriculture. At the present time the county returns five Members to Parliament. In addition, the Parliamentary Borough of Norwich returns two Members and Yarmouth returns one Member.

Transport. The county is served by the L.N.E.R. The main line from London passes through Thetford, Attleborough, Wymondham and Norwich. Another main line from Ipswich serves Yarmouth and

over three-quarters of the total area is cultivated. Of cereals, barley is the chief crop, but until recent years was approached by wheat. Rye and oats are also extensively cultivated. On the rich pasture lands sheep have been reared from early times. Cattle and horses are both represented, and in each case, the county has a breed peculiar to itself. Since the beginning of the nine-

teenth century two branches of agriculture—dairy-farming and fruit and vegetable culture—have increased remarkably. Sugar-beet is a recent venture, the prosperity of which is not yet assured,

though the crop is of great importance to farmers.

Historically, the county's chief industries have been those connected with the woollen trade, the material for which was supplied by the sheep. The first impetus to this was given by the peaceful penetration of the Flemish weavers in the middle of the fourteenth century, and from the fifteenth to the seventeenth centuries Norwich was one of the most prosperous cities of England.



SANDRINGHAM HOUSE
Country mansion of H.M. the King
Photo: Frith

In particular may be mentioned Worstead, which was the centre of the manufacture of the material of that name. To-day linen and silk goods are produced. Engineering and the manufacture of foodstuffs are also carried on.

An industry of much significance is herring fishing. Centred in Yarmouth, it causes a great influx of population, especially from Scotland, during the herring season. The oyster fisheries of the north coast have ceased to be profitable.

Chief Towns. The county town is Norwich (which see). The County Borough of Great Yarmouth is also described in a separate article.

King's Lynn. A Municipal Borough and market town, with an area of 6725 acres and a population in 1931 of 20,580, situated near the mouth of the Ouse. At one time it was a port which rivalled Yarmouth in the value of its trade; it is to-day a prosperous town, and the centre of the agricultural country of the reclaimed fenland. The Guildhall is a noble building, founded in the fifteenth century. A further feature is a gateway of the monastery of the Austin Friars, and a tower which is part of a thirteenth-century monastery of the Grey Friars.

Thetford. Municipal Borough and market town, with an area of 7096 acres and a population in 1931 of 4097, situated at the confluence of the Little Ouse and Thet. The town contains fragments of at least four medieval monastic houses, including those of a Cluniac priory of the twelfth century, an Augustinian priory of the fourteenth century, and of a Benedictine nunnery, possibly of the eleventh century. The earthworks on Castle Hill are of particular interest.

Cromer, an Urban District on the north-east coast, has long been a favourite watering-place on account of its sheltered position, fine beach, splendid bathing, and the additional attraction of the Royal Cromer Golf Club links. Sea walls and promenades protect the coast, on which the sea has encroached extensively in places, making it dangerous to shipping. There is a considerable fishing industry. Population (1931) 4177.

Antiquities and Mansions. The chief traces of prehistoric man are to be found in the heaths of the south-west. Here are Grimes Graves, flint mines which were worked at least as early as those at Cissbury on the South Downs. The only prehistoric encampment is at Tasburgh, near Flordon. There are traces of ancient trackways, notably Peddars Way, which can be followed from near Thetford to the coast at

Holme-next-the-Sea. Of the Roman occupation the chief evidence is afforded by Caistor St. Edmund. Here the Roman walls have been in places well preserved, and the foundations of several Roman houses and temples have been discovered. The earthworks at Thetford are representative of the Saxon period, and there are others at Norwich and Castle Rising. The three great Norman castles—those of Norwich, Castle Acre, and Castle Rising—have all been preserved in part, though the ruins of Castle Acre are inconsiderable. Caister Castle is a unique example of a fifteenth-century manor-house. Sandringham House, two miles east of Wolferton station, a favourite residence of the royal family, was built by King Edward VII when Prince of Wales in 1870. Here King George V died on 20th January, 1936.

NORFOLK, DUKES AND EARLS OF. Ralph de Weyer, Guader or de Waet was created Earl of Norfolk and Suffolk by William I, but, joining in insurrection with Waltheof Siwardsson, was defeated and deprived, dying a pilgrim in the Holy Land. In 1142 Hugh Bigod, whose father Roger had been given many East Anglian manors at the Conquest, was created Earl of Norfolk as reward for his support of Stephen of Blois, a grant confirmed by Henry II. Roger, second Earl, served Richard I, and was one of the twenty-five guardians of Magna Carta, as was his son Hugh, later the third Earl. Roger, fourth Earl, one of the most renowned warriors of the day, was one of the leading barons opposed to Henry III, on one occasion, called a traitor by the king. Earl Roger dared to answer that he had. He was declared Marshal of England, being a grandson of William Marshal, Earl of Pembroke. Roger, fifth Earl, is said to have successfully defied Edward I, who demanded of him foreign service with a bitter jest: "By God, Sir Earl, you shall either go or hang!" Having no children, he surrendered his honours to the Crown.

In 1312 Edward II granted the Earldom of Norfolk and the Marshalship to his half-brother Thomas de Brotherton (1301-1338), who served in the Scottish wars. After his death his daughter Margaret was created Duchess of Norfolk by Richard II. Elizabeth, her daughter by her first husband, married John, Lord Mowbray, whose ancestor, Nigel de Albini, had fought under William I, and whose mother, Joan of Lancaster, was descended from Henry III. Their son, Thomas Mowbray, was created Earl of Nottingham and Earl Marshal by Richard II, but he supported his father-in-law, Richard Fitzalan, Earl of Arundel, and was one of the Lords Appellant who domineered over the king. Changing his

party, he consented to the execution of Arundel, and was in command at Calais when the Duke of Gloucester, uncle to the king, died or was slain there. He was created Duke of Norfolk. He was later accused of treason by Henry Bolingbroke, also a Lord Appellant, and trial by combat at Coventry was arranged. Norfolk was the most famous lance in England, and had distinguished himself years before at the great tourney at St Inglebert; but Richard stopped the contest and banished both warriors. Norfolk died at Venice in 1400.

His elder son Thomas, styled Earl Marshal, joined the conspiracy of Scrope, Archbishop of York, and was beheaded in 1405. The second son, John, as Earl of Nottingham, fought in the French War, and was restored to the Dukedom in 1425. His grandson John, fourth Duke, who had in his father's lifetime been created Earl of Warren and Surrey, died in 1475, and his honours passed to Sir John Howard, grandson of Thomas, first Duke. Howard had distinguished himself against the French and the Lancastrians; he was slain fighting for Richard III at Bosworth Field. His son Thomas fought in the same battle and was attainted, but was restored to the Earldom of Surrey by Henry VII. In 1513 he utterly defeated James IV of Scotland at Flodden, and was subsequently restored to the Dukedom and Earl Marshalship; two of his granddaughters were Anne Boleyn and Catherine Howard, both wives to Henry VIII and both beheaded. His son Thomas, third Duke of this creation, was condemned for high treason, but saved by the death of Henry VIII; his son Henry, Earl of Surrey, a poet who had successfully introduced Italian measures to English verse, had been already beheaded. Norfolk was kept in the Tower until he was released and restored by Queen Mary. His younger brother, Lord William Howard, was Lord High Admiral, and used his influence to prevent the execution of Princess Elizabeth at the time of Wyatt's rising; his son Charles, later Earl of Nottingham, was in supreme command of the fleet that defeated the Spanish Armada in 1588. Thomas, fourth Duke, son of Surrey the poet, was beheaded in 1572 for planning marriage with Mary Queen of Scots, then a prisoner of Elizabeth.

Norfolk's first wife had been Mary Fitzalan, heiress to the Earldom of Arundel, and their son bore that title; he died a prisoner in the Tower in 1595. His great-grandson, Thomas, was in 1664 restored to the Dukedom of Norfolk with the original precedence of his ancestor John, first Duke. Henry Granville, fourteenth Duke, took by royal licence the surname of Fitzalan before that of Howard. The present holder of the title,

as Hereditary Earl Marshal, had the direction of the ceremonies which marked the death of King George V and the accession of King Edward VIII. He is Premier Duke of England. The Earldom of Arundel is held, without creation, by possession of Arundel Castle.

NORFOLK ISLAND. An isolated island in the South Pacific Ocean, about 900 miles north-east of Sydney, New South Wales, and 400 north-west of New Zealand. The island was discovered by Captain Cook in 1774 (see COOK, JAMES). Until 1914 it was politically a part of New South Wales, but since then has been controlled as a Federal territory of the Australian Commonwealth. It has an area of 13 square miles, and mountains rising to a height of 1040 ft. Most of the inhabitants are descendants of the members of the expedition ending in the *Bounty* mutiny, who were transferred here from Pitcairn Island in 1856. The total population numbers 1161. See PITCAIRN ISLAND.

Norfolk Island was used as a penal settlement by New South Wales until 1851.

NORMAN, R1

HON MONTAGU COLLET. Governor of the Bank of England since 1920, he was born in 1871, and was educated at Eton and King's College, Cambridge. In the South African War (1900-1) he served with distinction. He became a Privy Councillor in 1923. As Governor of the Bank of Eng-



MONTAGU NORMAN
Photo Topical

land, he has been largely responsible for the financial and currency policy of Great Britain since the Great War, in particular for the resumption of the gold standard in 1924, and its abandonment in 1931. See MONEY.

NORMAN ARCHITECTURE. A style of building developed by the Northmen (Normans) after their permanent establishment in France, and which came to be the prevailing style in England as well after the Norman Conquest. Norman architecture is regarded as a variety of Romanesque; it flourished from about the year 1000 until the thirteenth century, when it gave way to the Gothic school. The Normans made use of the cross-groined vault, and their adoption of diagonal ribs to strengthen the groined vault was a distinct innovation.

Another important advance was their plan of building interior passage-ways in thick walls, which had the effect of making such walls double. From this came the custom of



NORMAN ARCHITECTURE

The west front of Ifley Church, Oxon

Photo: Frith

making a window, or arcade, in the inner wall, opposite the one in the outer; the eye could thus view one design through the other. Norman architecture is characterized by round-headed openings, windows and arcades; cylindrical piers without mouldings; square or circular abacus; and low square towers. In their treatment of exteriors, and in their ornamentation, which was characterized by restraint and good taste, the Normans never showed the weakness of the florid style of decoration. The general effect is one of massiveness and solidity, as in the nave of Durham Cathedral or the transepts of Winchester. The donjon, or keep, type of castle was another Norman innovation.

NORMAN CONQUEST. The subjugation of England by Duke William of Normandy, known to history as William the Conqueror, in 1066. The military campaign which occupied a few weeks towards the end of that year was the culmination of a period of political penetration which had begun with the accession of Edward the Confessor in 1042. Edward had been brought up in Normandy, and during his reign Norman influence in English life was so marked that the ground was well prepared for William's invasion. Normans were appointed to many of the key positions in Church and State, and the favour shown to them by the king gave offence to the patriotic adherents of Earl Godwin, who was punished for his anti-Norman sympathies by exile (1051).

In the following year, Godwin returned and compelled Edward to remove from their

offices many of the Normans. Soon after, on the death of Godwin, his son Harold became the leader of the anti-Norman party and the most powerful subject of the king. The absence of a direct heir gave rise to obscure intrigues for the succession. Duke William had, during Godwin's absence, visited Edward, and obtained a promise, so he afterwards claimed, of the kingship. The nearest in blood to Edward was Edgar Atheling, a grand-nephew of the king, but, child as he was, his claims were easily passed over. Harold in 1064 fell by chance into the hands of Duke William, and, as a condition of his release, was compelled to take a solemn oath that he would support William's claims.

When Edward the Confessor died early in 1066, he left the Crown to Harold, and the Witan formally elected him king. William thereupon decided to make good his pretensions by force of arms. The Pope blessed his banners, and the promise of a share in the power and wealth which the conquest of England would bring was sufficient to rally a large force of Norman adventurers. During the summer of that year, transports were built for the crossing of the Channel. Harold's opposing fleet, anchored off the Isle of Wight, was dispersed by storm. At the critical moment, the Saxon army had been drawn from its defensive position on the south coast to meet another peril in the north. Harold Hardrada, King of Norway, had effected a landing in Northumbria and had defeated the northern Earls. King Harold by forced marches went to oppose the invader, and in the terrific battle of Stamford Bridge utterly defeated him. Hardly was the battle over when news arrived of William's landing in the south. Meeting with no opposition, the Normans had come ashore at Pevensey and pitched camp at *Hastings* (28th September).

Harold hurried back with his already weary house-carls, gathered the local fyrd, and instead of adopting a waiting policy, determined to give immediate battle. On the hill where Battle Abbey now stands, he took up his position and strengthened it with a palisade. This was sufficient to withstand the shock tactics of the Norman cavalry, until the losses caused by arrow-wounds weakened the defence. Then William, by the stratagem of a feigned retreat, drew the English outside their stockade, and they were easily ridden down by the Norman horsemen. Harold and his house-carls lay slain to a man on the hill-top (14th October).

After Hastings, William seized control of the Cinque Ports and went on to Canterbury. Thence he followed the line of the Thames, for the present avoiding London.

At Wallingford he crossed to the north bank, and, by a detour which took him to Berkhamstead, he entered London from the north-west. By his circular march, he had isolated the capital and ensured that no resistance would be offered. Though in the interval Edgar Atheling had been proclaimed king, the Witan now submitted and acknowledged William. His coronation in Westminster Abbey took place on Christmas Day with the usual ceremonial. William based his claim not on his success in arms, but on blood relationship with the royal line of England and on election.

The work of subjugating the rest of the country was left largely to the King's lieutenants. Numberless Saxon estates were confiscated to the Conqueror and granted by him to his supporters, who built for themselves strong castles for the domination of the countryside. This expropriation went on for several years. Each act of native resistance was followed by the forfeiture of lands. By degrees the landed aristocracy became almost entirely Norman, while considerable numbers of Anglo-Saxon freemen sank into a condition of servitude.

William consolidated his power by the creation of a centralized system of government. The territorial authority of the barons was diminished by the device of dispersing their fiefs, and by requiring all freemen to render personal homage to himself. All land was held of the King in feudal tenure, either directly or in sub-tenancy, and land-holding involved serious obligations. To assess these obligations an exhaustive inquiry was made

into the extent, value, and ownership of the manors, and the results gathered together into the *Domesday Book* (1085). The homage of the King's tenants rendered on Salisbury Plain in the following year may be said to have symbolized the completion of the conquest. See DOMESDAY BOOK.

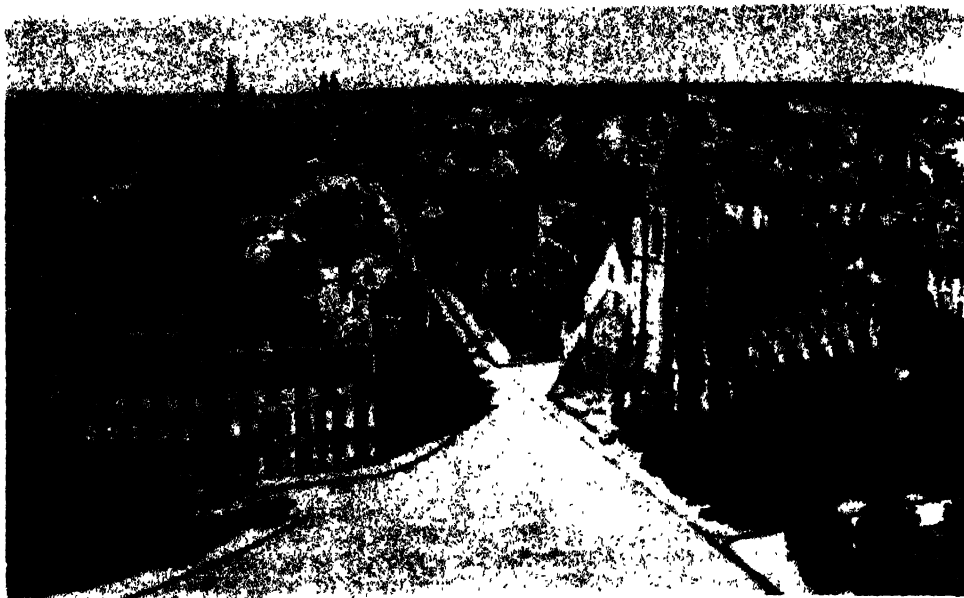
NORMANDY. The old name of a fertile and prosperous region in France, bordering on the English Channel, which Charles the Simple granted as a fief to the Normans in 912, after their settlement at Rouen under their chief Rollo, or Hrolf.

The province is now divided into the departments of Seine-Inférieure, Eure, Calvados, Manche, and Orne. Among its important towns and cities are Rouen (population, 122,957), the capital of old Normandy, with cotton and linen mills; Havre (population, 165,076), with extensive imports of cotton, oil, coffee and timber; Harfleur, Caen (population 57,528), and Cherbourg, a port of call for Atlantic liners. The region is a low chalk plateau, cut by wide river valleys covered with fertile, alluvial soil. The pastures of Normandy are rich and have made famous its butter and cheese. Wheat is also grown, and apples are used in cider-making. Iron ores occur south of Caen. After being worked in the Middle Ages, the mines were abandoned until recent times, but are now again in operation. Caen imports the coal required.

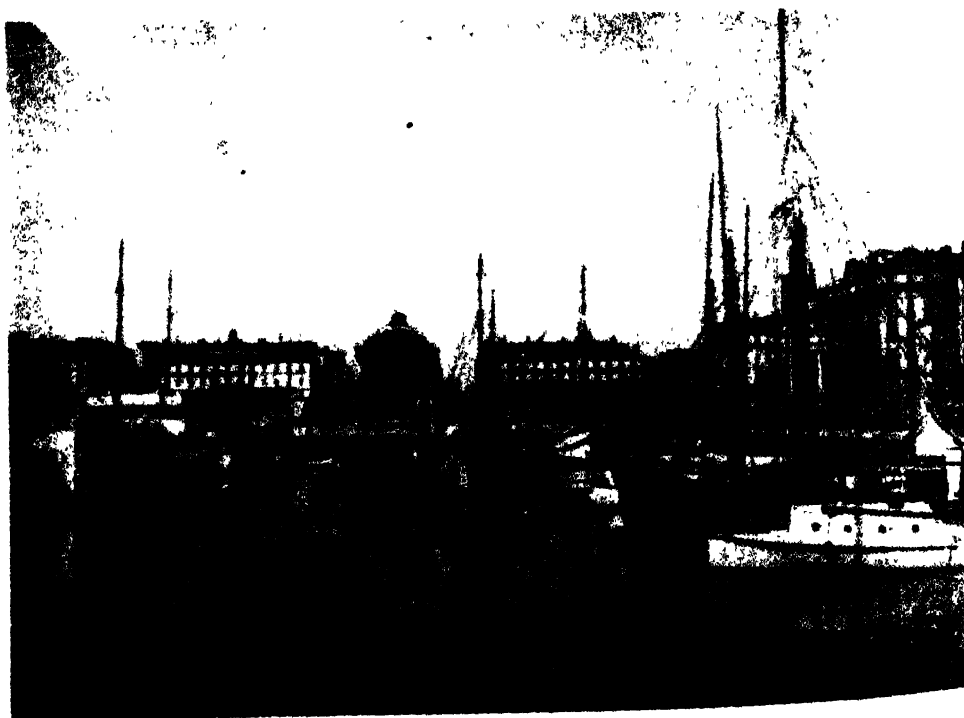
From the Norman chief Rollo descended the line of dukes whose most celebrated representative was William the Conqueror. Normandy was twice won by the English during the Hundred Years War, but it was



ROUEN
F.T.O.



CAEN, NORMANDY
Photo: Neurdin, Courtesy F.T.O.



LE HAVRE
Photo: G. Lefevre, Courtesy F.T.O.

finally recovered by the French in 1449, becoming then a permanent possession of France. The Channel Islands, once a part of Normandy, now form an integral part of Great Britain.

NORMANDY, Dukes of. In 912 the Norseman Rollo was granted land at the mouth of the Seine by Charles the Simple, King of the Franks. Rollo, or Hrolf the Ganger, as he was called, had for years come only to ravage, but now he settled with his followers and fought against the enemies of his new feudal lord. Normandy, as this territory of the Northmen was called, grew and prospered under a succession of able Dukes. William Longsword was as fierce a warrior as his father Rollo. His death in 943 left the ten-year-old Richard the Fearless at the mercy of his enemies, but when he grew to be a man he restored the ducal power and hastened the civilization of his subjects. He reigned till 996. His son, Richard the Good, continued his work; it was with him that the royal house of Wessex sheltered from Cnut. Richard III became Duke in 1026, and his brother Robert the Devil succeeded two years later. Robert, after much hard fighting with vassals and external foes, set out on pilgrimage and died at Nicaea in 1035. William the Bastard, his only child, was eight years old and the grandson of a tanner, and it was inevitable that insurrection, checked with difficulty by the warrior Dukes, should now break out. Order was partially restored by his guardian, Ralf de Wacey, aided by the Church. By the time he was fifteen, the young Duke was beginning to take control, and he proved himself as terrible a master as his ancestors had been. After his conquest of England he, like many of his barons, divided his time between kingdom and duchy. On his death, according to old custom, his eldest son Robert took the ancestral domain, the second son William the new acquisition. Robert Curthose was a magnificent fighting-man but no ruler. Defeated in England, he turned Crusader, pledging his duchy to his brother for the necessary supplies. He entered Jerusalem in triumph, won a great reputation, and returned to find he had again missed a kingdom. In 1106 his brother Henry invaded Normandy and Robert was defeated and captured, to drag out old age as a blinded prisoner in Cardiff Castle. His wooden effigy in Gloucester Cathedral is not contemporary. John Lackland or Softsword was driven from Normandy by Philip Augustus, and since then the Dukedom has been at times conferred on cadets of the French Royal House. To this day, however, there is a Norman Duke in England, for it is as Duke of Normandy that the King holds

the Channel Islands. Lands are still held there on feudal tenure, such as presenting a rose to the Duke on every visit or riding into the sea to bear him dryshod from his ship. A Channel islander may still make direct appeal to ducal justice—*A mon aide, mon Prince, ou me fait tort*. It was because the Kings of England were also regnant Dukes that for long they would not grant the ducal honour to their subjects, and then at first only to their own family.

NORMANS. The name applied in history to those Northmen, or Norsemen, from the Scandinavian peninsula, who established themselves permanently in France. From *Norman*, which itself is a softened form of *Northmen*, comes the word *Normandy*, the name given the old French province founded by those people. The Norsemen began to make raids upon the coasts of France during the reign of Charlemagne, and in 845, thirty years after his death, they plundered Paris. After several years of invasions and forays, which the later kings of the Carolingian dynasty were unable to prevent, Charles the Simple granted to Rollo, the leader of the Northmen who had established a colony at Rouen, a tract of land in the north of Neustria. In return, Rollo pledged himself to render Charles homage and to adopt Christianity. This was in the year 912. For the next hundred years the Normans prospered in their adopted country, taking on the refinements of civilization and becoming the most cultured people of Europe.

Then, early in the eleventh century, the spirit of adventure revived, and the Normans made their way, for purposes of conquest, into Southern Italy and Sicily, establishing there a state which is known historically as the Kingdom of Naples and Sicily. Famous among the Norman leaders of this period is Robert Guiscard (1015-1085), who fought and defeated the Byzantine Emperor. Duke William of Normandy led an army into England in 1066 and defeated the English king, Harold, at the Battle of Hastings. As a result, William gained the throne and a Norman dynasty ruled in England until 1154. Henry II, who then succeeded as the first Plantagenet, was descended from the Dukes of Normandy and also from the Royal House of Wessex.

NORMS. The three Fates of Norse mythology. They were represented as three sisters of different ages, whose names were Urd, Verdandi and Skuld. Urd, as the personification of former days, was represented as old and feeble, ever looking backward. Verdandi, typifying the present, appeared as a courageous, energetic young woman, who looked always straight ahead; Skuld, emblematic of the future, was closely

veiled, and in her hand was an unopened book.

NORSE GODS. See MYTHOLOGY.

NORSEMEN. See NORTHMEN.

NORTH, FREDERICK, LORD, EARL OF GUILFORD (1732-1792). An English statesman whose uncompromising attitude toward the colonies in America did much to bring on the Revolutionary War. He studied at Eton and at Trinity College, Oxford, and in 1754 entered Parliament. After serving in the

Treasury as paymaster, and as a member of the Privy Council, he became, in 1767, Chancellor of the Exchequer and leader of the House of Commons. It was while he held this post that the duty on tea was imposed which so stirred the American colonies.

In 1770 North became Prime Minister, but George III practically dictated



LORD NORTH
Photo: Brown Bros

his policies and held him to them, even after North himself had been convinced that they were ruinous. Although he renounced in 1778 the right to tax the colonies, it was not until 1782 that he resigned his office. In his personal character, Lord North was above reproach. See GEORGE III (England).

NORTH, SIR THOMAS (1535?-1601?). Translator. North's great work was a version (from the French of Amyot) of Plutarch's *Lives*. This famous translation is still read for the dignified yet lively English in which North wrote it, as well as for the great interest of the subject-matter. It has the additional importance of being the source from which Shakespeare drew his materials for such plays as *Antony and Cleopatra* and *Julius Caesar*. In many passages Shakespeare reproduces North's translation almost word for word.

NORTHALLERTON. This, the old capital of the North Riding of Yorkshire, is 31 miles north-west of York, on the main line of the L.N.E.R. It had a population of 4787. at the 1931 census. It is a town that has grown gradually from Saxon and Norman times, and retains many relics of historical interest. To-day it is chiefly dependent upon agriculture, though there are linoleum, timber and engineering industries.

All Saints' Church is of varied architecture, and some of the pillars date back to the early twelfth century. Porch House, near the church, is one of Northallerton's oldest houses, built in 1584.

NORTH AMERICA. The discovery of America was a gradual process. About A.D. 986 the Norseman Bjarni first sighted America, and in 1002 Leif Ericson visited Helluland and Markland, which were probably Labrador and Newfoundland. But the Norse did not follow up their discoveries, and though the story lived in their sagas there is no proof that knowledge of the existence of America reached other parts of Europe. Columbus, in 1492, searching for a new route to the trade of the East, discovered Watling Island in the Bahamas. On his third voyage in 1498 he sighted the coast of South America and not until his fourth voyage in 1503 did he reach the coast of Central America. Meanwhile, in 1497 Cabot had made a landfall in the north of the Continent, which was probably either Labrador, Newfoundland or Nova Scotia. Though Columbus was not the first to discover North America, it was his voyages that led to penetration. The Treaty of Tordesillas (1494) gave Spaniards a right to their discoveries. In the sixteenth century the French began to enter North America by the St. Lawrence estuary, and Cartier in 1534 laid the foundations of French control, which pushed down the Mississippi. Cabot's discovery had drawn English as well as French fishers to Newfoundland; English attempts at colonization did not fructify until the sailing of the *Mayflower* in 1620 to found a settlement in Massachusetts Bay. This was followed by other English and Dutch colonies on the eastern coast. The thriving French fur trade in the north then drew English competitors, who made use of a rival route to circumvent the French. In 1670 the Hudson's Bay Company of Merchant Adventurers was founded, and their efforts eventually opened up western Canada and the Arctic Islands. In the extreme north-west, Russian influence was brought by fur trappers across Bering Strait; hence the Russian claims to Alaska.

During the nineteenth century, English-speaking peoples carried their sway, in Canada and the United States, across the continent to the Pacific. There was at the same time a steady decline in Spanish power. Mexico threw off the yoke of Spain, and other areas such as Texas and New Mexico were acquired by the United States.

The distribution of place-names, Spanish in the south and south-west, English in the east and north-west, French in the north-east, is some indication of the spheres of exploration of the respective nations.

The name *America* is said to be derived from that of Amerigo Vespucci, who is believed, though not without a certain element of doubt, to have made four voyages between 1497 and 1503 along the coasts of Central and South America.

Physical Features. North America is the third largest continent; area 9,000,000 square miles. It extends from about lat. 16° N. in southern Mexico to lat. 83° N. in the Arctic. It is generally regarded as embracing Canada, Newfoundland, Greenland, Alaska, the United States and Mexico.



IN MANITOBA

North shore of Char Lake, Eagle Bay,
Riding Mountain Park.

Photo: Canadian Official News Bureau

In the surface relief, five main features are noticeable. On the east the Atlantic coastal plain, extending from New England to Florida, is mainly an area of recent rocks; broad in the south, where it is lagoon-fringed and harbourless, and narrow in the north, where subsidence has led to the sea invading the lower valleys and causing great estuaries on which lie important seaports. Behind this plain lies a broad belt of uplands and mountains, the Appalachian Highlands, continued in Newfoundland. It is in the south that they are widest and reach elevations of over 6000 ft. Valleys that breach these highlands, such as the Champlain valley, the Mohawk gap, and the Cumberland gap, focus human movements between east and west. To the north-west of the highlands lies the upland area of ancient rocks known as the Laurentian Plateau, which embraces most of eastern Canada. In the main it is a lake-studded area of poor soil and little attraction for settlement, but on its southern flank is the favoured St. Lawrence valley and

the area of the great lakes, where fertility is great. The structure of the Laurentian Plateau continues into the eastern islands of the Arctic Archipelago and underlies the ice-sheet of Greenland. In the heart of North America both the Laurentian Plateau and the Appalachian system slope down to the Central Plains, which extend from the Arctic Ocean to the Gulf of Mexico.

To the west of about long. 100° W., the Central Plains rise to the High Plains, which end fairly abruptly against the mountain system known as the Western Cordilleras. This occupies the remainder of the continent, and is 1000 miles wide in the United States. There are, broadly speaking, three series of these Tertiary foldings, with basins and plateaux lying between. Volcanic activity has been marked in the higher ranges, but now is confined mainly to the far south, i.e. Mexico, though earthquake shocks are not infrequent on the Pacific coast. The three series of ranges from east to west are (1) the Rocky Mountains of several parallel ranges, with peaks rising to over 14,000 ft. There are several passes through these mountains. (2) Next come the ranges known variously as the Cascades of Canada and the Sierra Nevada of the United States. They contain the highest peaks in the continent. (3) Lastly there are the low discontinuous Pacific ranges which fringe that ocean and in many parts are submerged by the sea, forming islands such as Vancouver Island, the Queen Charlotte Islands, and the Alaskan Archipelagos.

Rivers and Lakes. Three great river systems drain the greater part of the continent. The Mississippi of the Central Plains drains over 1,250,000 square miles, and, with its many tributaries, gives 10,000 miles of navigable waterways. A delta on the Gulf of Mexico, however, prevents sea-going navigation. The St. Lawrence drains the Great Lakes into the Atlantic; falls and rapids impede navigation above the seaport of Montreal. The Mackenzie drains the north of the Central Plains to the Arctic, and is of little use for navigation.

Of many lakes, due largely to glacial action in the past, the most notable are the five great lakes on the Canadian-United States frontier: Superior, 31,800 square miles, Michigan, 22,400 square miles, Huron, 23,020 square miles, Erie, 9,940 square miles, and Ontario, 7,540 square miles. Their surfaces vary from 602 ft. (Superior) to 247 ft. (Ontario) above sea level. These lakes have been connected by canals and make an important line of transport. The greatest fall, between Erie and Ontario, is overcome by the Welland Canal, which circumvents the great Niagara Falls.

Climates vary from Arctic conditions in Northern Canada, Labrador and Alaska to tropical conditions in the lowlands of Mexico. Generally speaking, the winter is cold and the summer hot, but there are wide variations. The Pacific coast has a mild open winter, in contrast to the Atlantic coast; both coasts have a warm rather than a hot summer. Rainfall is heavy on the northern Pacific coast and in the southern and south-eastern parts of the continent; the interior gets less and the south-west is arid.

Vegetation. Forests originally covered much of the continent, and great areas still remain. They vary from the coniferous forests of spruce, pine, fir, larch, and hemlock that cover most of Canada and Alaska; the temperate forests of conifer, maple, plane, oak and elm of the south-east; the ever-green forests of cypress, oak and conifers of California, to the tropical forests of Mexico. The interior is naturally a region of grassland, passing to steppe and desert in the dry south-west, and to scrubland in the plateaux and basins of the Cordilleras. The Arctic north and islands have a tundra vegetation.

North America was not originally the home of many plants of cultivable value, maize (or Indian corn), tobacco, potato and some kinds of cotton being the notable exceptions. But Old World crops were introduced at an early date and thrive well, so that North America now produces a third of the world's wheat, nearly half the oats, half the maize, a third of the tobacco, and over half the cotton. There are few crops except tropical ones that North America cannot produce.

Animal Life. The fauna of North America is to a great extent identical with that of Europe and the northern and central parts of Asia. In the extreme north, the most important animals found are the walrus, the polar bear, the caribou or American reindeer, the fur seal, the Arctic fox, the beaver, the otter, the marten, and other fur-bearing animals. In the southern belt of this region, extending as far south as Northern Maine,

are found the moose and the deer. Large herds of bison formerly roamed over the central plains, but these animals are now nearly extinct, and only a few herds are found in national and private parks. Among the animals which are characteristic of North America are the puma, or American lion, the grizzly bear, the gopher, or pouched rat, the musk-rat, the prairie dog, the Canadian porcupine, the raccoon, the skunk, the musk-ox, the bighorn or Rocky Mountain sheep, the pronghorn or Rocky Mountain goat, and the opossum.

Among the native birds of this continent are the Baltimore oriole, the bobolink, the cowbird, the flycatchers, the wild turkey, and the many species of wood warblers. The reptiles are not conspicuous, most of the snakes being harmless. The only venomous species are the rattlesnake, the copperhead, and certain varieties of water snake. The largest reptile on the continent is the alligator, which

is found in the lagoons around the Gulf of Mexico. The United States is richer than any other part of the world in river molluscs, especially river mussels. There are thousands of species of insects, including flies, bees, beetles, moths, and butterflies. Some of the latter are noted for their gorgeous hues.

Mineral Resources. These are great. North America is believed to have 70 per cent of the world's coal resources, perhaps half the world's mineral oil, and great quantities of iron, copper, zinc, lead, silver, nickel, and gold. Tin ore is scarce. Phosphates, important in agriculture, are plentiful. Power resources in coal, oil and water also are great.

People and Population. The aborigines of North America, known as the American Indians or Amerinds, are people of Asiatic descent who would appear to have entered the continent across Bering Strait and spread southwards. They became hunters on the plains and fishermen on the coasts, and, like all hunting tribes, resented the calm intrusion of alien invaders. The Eskimos



INDIANS AT THE MOUTH OF THE NORTH-WEST RIVER, LABRADOR

Photo: Canadian Pacific Railway

probably represent a later wave of migration from Asia. In Mexico there developed in the early centuries of our era the Aztec and Maya civilizations, dependent largely on maize and bean cultivation. It is still an open question whether these civilizations were indigenous to American soil or the result of cultural drift across the Pacific Ocean. Few American Indians now remain. In Canada there are about 120,000, living mainly on reservations, and about 7000 Eskimos. In the United States about 350,000 Indians remain, almost entirely on reservations.

The spread of Europeans has gradually deprived the aborigines of all but the least accessible lands. The total population of North America is now over 150,000,000, and, though several parts are densely populated, there is still room for a vast increase in numbers of population. Immigrant population, which grew rapidly in the nineteenth century, has now fallen off since the United States and Canada have put drastic restrictions on entry and virtually closed the countries to Asiatics.

The 9,000,000 square miles of North America are now divided as follows—

English-speaking countries—

United States, including Alaska and the Panama Canal Zone: area 3,613,738 square miles, population, 122,873,791 (1930). Canada: area, 3,684,463 square miles; population, 10,049,000 (1936). Newfoundland and Labrador: area, 162,734 square miles; population, 290,274 (1934).

Spanish-speaking country—

Mexico. area, 768,883 square miles; population, 16,553,398 (1930).

French-speaking country (excluding Quebec province of Canada)—

Saint-Pierre and Miquelon: area 93 square miles; population about 4000.

Danish-speaking country—

Greenland: habitable area, 31,284 square miles; population, 16,630 (1930).

Transport. The rivers, where navigable, were the first lines of communication in the continent. Until about the middle of last century the Mississippi was the chief route in the plains which it traverses. Railway construction began slowly, but in the second half of the nineteenth century expanded at an enormous rate. The main railway lines are now east and west across the continent, and owing to the great distances to be traversed, North America has a greater railway mileage than any other continent. The United States has more than one-third of the world's mileage, and Canada, in relation to its population, has a greater mileage than any other State. It may be noted that the opening of the Panama Canal in 1914 brought the Pacific coast of North America, with its trading possibilities, into closer touch with Europe than had previously been possible.

The history and development of North America after the sixteenth century are described in the articles on UNITED STATES; CANADA; MEXICO, etc., and in separate articles on component states and provinces.

NORTHAMPTON. A County Borough and the county town of Northamptonshire, 66 miles from London, with an area of 6201 acres and a population in 1931 of 92,314, situated on the River Nene, and served by the main line of the L.M.S.R. from London



NORTHAMPTON FROM ALL SAINTS' TOWER

Frith

to Birmingham. It is also in direct communication with Leicester, Nottingham and the North.

It is the principal British centre of the boot and shoe industry, of which the first Guild of Manufacturers had been established in the city early in the thirteenth century. To-day more than a quarter of the working population is employed in this industry. Second in importance is the manufacture of leather, which has flourished since the Middle Ages, when Northampton was the chief centre of the tanning industry. Engineering works are numerous and specialize in the production of motor bodies and castings.

Northampton is a town of great historic interest. Of early Saxon foundation, it was known as Hamtune. It was at least twice captured by the Danes, and in 1010 was razed to the ground. It became the site of a Norman Castle after the Conquest. It was in later times the scene of the trial of Saint Thomas à Becket (1164), and Parliament was convened here several times prior to 1381. In 1675 occurred the "Great Fire" which destroyed most of the town. Three churches, however, escaped. The Church of St. Peter, built in the twelfth century on the site of an earlier Saxon chapel, is almost entirely of the late Norman period, and was restored under the direction of Sir Gilbert Scott. The Church of the Holy Sepulchre, dating from the first half of the twelfth century, is on the model of the Church of the Holy Sepulchre in Jerusalem, and is one of the four existing round churches in England. The Church of All Saints is mainly of the seventeenth century and later, but the tower is a part of the original building.

NORTHAMPTONSHIRE. A south-midland county of England with an area, including the Soke of Peterborough, of 638,612 acres and a population (1931) of 361,273 and, excluding it, an area of 585,148 acres and a population in 1931 of 309,428.

Physical Features. Northamptonshire is physically one of the most irregular of English counties, and at first glance appears as an ill-formed mixture of tumbled hill and dale. Closer inspection shows three principal features: firstly, there is the valley of the Nene running from south-west to north-east; secondly, a broad area of fenlands in the north-east where the county borders on Lincolnshire and Cambridgeshire; and thirdly, the remainder of the county, consisting of two ridges of high ground, one to the east and one to the west of the Nene, radiating from a central upland mass in the south-west. These hills nowhere exceed 750 ft. in height.

The county draws its character from several types of scenery closely associated

with the surrounding shires. Thus, the level fenland of the north-east, including the Soke of Peterborough and the country round Oundle, is practically indistinguishable from the lowlands of Lincolnshire and the Isle of Ely. It is a featureless countryside, broken up by numerous dykes and small streams, but has been developed during the last century into an agricultural country which bears rich crops of cereals and vegetables. By contrast, the uplands of the south-west, which form part of the main watershed of Central England, are reminiscent of the rolling hills of the West Midlands. Everywhere there are rounded summits commanding long views over Oxfordshire and Warwickshire, among which Arbury Hill (735 ft.) and Charwelton Hill (740 ft.) are the most conspicuous. From the extreme north end of the ridge round Easton the whole landscape is spread out to the confines of the Wash.

The more easterly ridge extending from Towcester, and separating the valleys of the Nene and Ouse, has an average elevation of about 300 ft. and resembles the adjoining country of North Buckinghamshire.

The courses of both the chief rivers are well defined. The Nene rises near Staverton, thence flowing east to Northampton, and following a north-easterly course to Peterborough. Throughout its course below Northampton, it is bordered by a wide belt of meadow lands backed by gently sloping hills. Owing to the lowness of the banks, the country is liable to extensive flooding. Of its tributaries the most important are the Ise and Harper's Brook.

The Welland forms the northern boundary from Market Harborough to a point near Crowland, but receives no important tributary on the right (Northamptonshire) bank. The other rivers include the Avon, Cherwell and Ouse, all of which spring in the western uplands, but attain no significance within the county.

History. Northamptonshire has little individual history, although many events of historic interest have taken place on its soil, and it possesses two of the most historic cities in England—Northampton and the cathedral city, Peterborough. In pre-history the county may be regarded as maritime, for what comprises the fens was at an early period covered by the sea, and well into the Middle Ages was impassable except by boat. The Northamptonshire uplands, therefore, formed the most easterly strongholds of Palaeolithic and Neolithic man, and many of the hill-top fortresses have survived the ravages of man and time. In the Roman period most of the county lay between the two great arteries to the north—Watling Street, passing through the west, and Ermine



NORTHAMPTONSHIRE

1. Earls Barton Church, showing one of the most perfect Saxon towers in Great Britain. 2. New Street, Oundle. 3. Badby, a village two miles south of Daventry. 4. Queen Eleanor Cross, Northampton. 5. Rockingham: looking up the village street toward the Castle on the hill.

Photos: Taylor; Frith

Street through the east. On each of these roads there was at least one important station—Towcester on the former, and Castor on the latter. In addition, the site of the present Irchester was a fortified position.

In 870 the county town was captured by the Danes, and, after the Treaty of Wedmore, became one of the Danish burghs, when the whole district fell within the Danelaw.

Recovered from the Danes during the campaigns of Edward the Elder, the county received the Normans without effective opposition, and castles were set up at numerous places, including the county town, Barnwell and Rockingham. Northampton was the scene of many Parliaments during the fourteenth century. Mary Queen of Scots was beheaded at Fotheringay Castle.

In the Great Rebellion the whole county was ardently opposed to the Royalist cause. The Battle of Naseby was fought within the county, and its site is preserved.

The Parliamentary representation of the county is limited to four Members returned by the Daventry, Kettering, Peterborough and Wellingborough Divisions. In addition, the Borough of Northampton returns one Member.

Communications. Historically, the slow-flowing Nene has been the principal means of communication, and through the Middle Ages was a thriving artery of commerce. To-day the barge traffic downstream from Northampton is not large, yet this section of the Nene, down to the sea, together with the Grand Union Canal, which serves Blisworth and Daventry, with a branch to Northampton, form a network of waterways which is the equal of any in England.

It has been pointed out that Watling Street passed through the county. From the Roman period onward this has always been a main route to the North—a factor which has further contributed to the county's industrial expansion. The principal railways are controlled by the L.M.S., of which two main lines serve the whole area. From London there are direct services to Wellingborough and Kettering.

Agriculture and Industries. Nearly two-thirds of the total acreage is under permanent pasture. Both cattle and sheep are reared on a large scale, but, in particular, the cattle in the alluvial lands of the Nene and Welland flourish exceedingly. Sheep are practically confined to the south-western uplands. Pig-breeding is a recent introduction. Among cereals pride of place is taken by wheat; next in order is barley. Although well-wooded and containing within its boundaries the remains of the Forests of Rockingham and Whittlebury, Northamptonshire has not been extensively afforested for

commercial purposes, and the ash, for which the county has long been noted, is tending to disappear.

The shire has never been purely agricultural. Its position in relation to main roads and waterways has assured its commercial development. The wool, leather, lace, and iron industries all date from an early period. The leading industries to-day are leather,

boots and shoes, and iron. At Weldon building stone of fine quality is quarried.

Antiquities. The most perfect prehistoric antiquity is Hunsbury Camp, traditionally known as a Danish encampment, but now established as a pre-Roman fortification. Unfortunately it has been undermined by excavation for iron ore. Of the hill-top fortresses, one at Arbury Hill, one near Daventry, and Rainsborough Camp, near Charlton, are the three next in order of merit. The Saxon period is represented exclusively in ecclesiastical architecture. The towers of Barnack Church and Earls Barton Church are in a class by themselves, and in the Churches of Wittering and Brigstock there is much of interest. Of the Norman castles only five can be traced at the present time. Northampton is of early twelfth-century construction, but only a postern gate with a portion of the wall survives. Rockingham Castle, probably the first to be built in the country by William the Conqueror, has more extensive remains.

Chief Towns. The county town is Northampton (which see). The city of Peterborough



and the Urban Districts of Kettering and Wellingborough are also described in separate articles. The remaining Boroughs are Brackley (area 1685 acres, population in 1931, 2097); Daventry (area 3633 acres, population in 1931, 3609); and Higham Ferrers (area 1945 acres, population in 1931, 2930).

NORTH AUSTRALIA. A former political division of the continent of Australia, created in 1927 and dissolved in 1931. It is now the northern half of Northern Territory, which extends north and south through two-thirds of the continent, to the northern boundary of South Australia.

NORTH BERWICK. See EAST LOTHIAN.

NORTH CAPE. A rocky headland rising abruptly to a height of 1000 ft. above the

in the Blue Ridge Mountains and have a mainly south-east course, entering the sea through wide-mouthed harbours. The Roanoke, Chowan, Tar, and Neuse, draining the northern section, enter Albemarle and Pamlico sounds. The Cape Fear, Black, and N.E. Cape Fear rivers drain the south-eastern part of the state, joining at Wilmington. The region west of the Blue Ridge Mountains is drained into the Mississippi basin by the headwaters of the Tennessee.

Agriculture. About 60 per cent of the area of the state is farmland. The most important products are cotton, tobacco, and maize, but the state produces many diverse crops. The north-western mountain region, with its fertile soil, bears heavy crops of hay, wheat, tobacco and potatoes. The mountain valleys and uplands are well suited to the raising of livestock, both beef and dairy cattle.

The Piedmont section is the chief manufacturing area, and much of the raw materials for the cotton mills and tobacco factories is grown there.

Manufactures. The principal industry is the manufacture of cotton goods, in which 550 mills are engaged.

The making of cigars and cigarettes, tobacco and snuff is next in importance. Lumber and timber products, including rough timber, materials for interior finishing, furniture and tar, resin and turpentine, rank third among the state's manufactures. Others are the production

of flour, cotton-seed products, fertilizers, and knitted goods.

Government. The present constitution, adopted in 1876, is the fourth constitution of the state, and was revised and amended in 1879, 1888, and 1900.

The legislative power is vested in a General Assembly consisting of a Senate of fifty members and a House of Representatives of 120 members.

The executive power is vested in a Governor, Lieutenant-Governor, Secretary of State, Auditor, Treasurer, Superintendent of Public Instruction, and Attorney-General. The Governor's power is greatly limited by an administrative council.

The judicial department consists of a supreme court, having one chief justice and four associate judges elected for eight years, superior courts, district courts, justices of the peace, and inferior courts.

NORTHCLIFFE, ALFRED CHARLES WILLIAM HARMSWORTH, VISCOUNT (1865-1922). British journalist and newspaper proprietor. His first enterprise was to start a school magazine, and when fifteen he began



THE NORTH CAPE

It is at latitude $71^{\circ} 10'$ North. From 12th May to 30th July the sun does not set at this point.

Photo: OROCO

sea, and situated on the island of Magerö, contiguous to the mainland of Norway, in the Arctic Ocean. In the summer the cape attracts many visitors, who come there to view the "midnight sun."

NORTH CAROLINA. An Atlantic state of the U.S.A., with an area of 52,426 square miles and a population (1930) of 3,170,276.

There are twenty-one cities in the state with over 10,000 inhabitants, the largest of which is Charlotte, with 82,675 in 1930. Others are Winston Salem, Greensboro, Durham, Asheville, Raleigh, the capital (37,379), and Wilmington.

Physical Features. A coastal plain occupies the eastern half of the state, the Piedmont plateau the central section, and the Appalachian system the west. The highest peak is Mount Guyot (7025 ft.).

A narrow barrier of sand beaches stretches 325 miles along the entire coast, enclosing Albemarle and Pamlico Sounds and smaller tideless lagoons and bays. The bar projects in prominent points at Cape Hatteras, Cape Lookout, and Cape Fear.

Nearly all of the coastal-plain rivers rise

contributing to local papers. He was associated with several journals before beginning in



LORD NORTHCLEFFE
Photo - Brown Bros.

1888 publication of *Answers*. This periodical laid the foundations of the Amalgamated Press. In 1894 Alfred and his brother Harold (see ROTHERMERE) bought the *Evening News*, and in 1896 launched the *Daily Mail*. In 1903 the *Daily Mirror* was started as a woman's paper and failed; changed to an illustrated paper it proved very successful.

The *Continental Daily Mail* appeared in 1905 and control of *The Times* was acquired in 1908. Northcliffe exercised considerable political influence through his papers and assisted Lloyd George in supplanting the Asquith Government in 1916. In 1917 he was chairman of the British War Mission to America and was created a viscount. In 1918 he was Director of Propaganda in Enemy Countries. Far-sighted, a supporter in turn of the motor and the aeroplane, Northcliffe revolutionized daily journalism and was the founder of the "popular" Press.

NORTHCOTE, JAMES (1746-1831). An English painter, celebrated for his work in portraiture, and also a biographer, who wrote histories of famous artists. He was born in the city of Plymouth, and studied in the

schools of the Royal Academy. In 1777 he went to Italy for further study. Upon his return to England, he was for a time an assistant to Sir Joshua Reynolds. The first commission which brought him renown was an order to paint nine pictures for the Shakespeare Gallery, including "The Murder of the Princes in the Tower." "The Death of Wat Tyler," finished in 1786, is another well-known picture. His literary fame rests on biographies of Reynolds and Titian.

NORTH DAKOTA. A north-central state of the American Union; lying on the Canadian frontier, it has an area of 70,837 sq. miles, and a population (1930) of 680,845. In 1930, Fargo (28,619), Grand Forks, Minot, and Bismarck (11,090), the capital, were cities with over 10,000 inhabitants.

The Land. The state consists of three level or gently rolling plains, rising one above another, from east to west. The lowest section is the broad, level valley of the Red River. The Red River Valley rises gradually to the rolling prairies of the central plain, in which the only section of high elevation is the Turtle Mountain region on the Canadian border. West of the central plain, the Plateau du Coteau du Missouri, a bold, wooded escarpment, extends from the northwest corner diagonally across the central region.

The smaller section south-west of the plateau contains rough semi-arid valleys, broken by numerous buttes. Following the Little Missouri River for a distance of ninety miles are uneven wastes known as "Bad Lands." These lands present a panorama of buttes and mesas, scarred by ravines, and scattered over with sparse juniper forests.

The eastern portion of the state is drained



"BAD LANDS" OF NORTH DAKOTA
by P. & A.

into Hudson Bay by the Red River and its tributaries. The Dakota, or James River, drains the south-central part of the state. The western part of the state is drained by the Missouri and its tributaries entering it from the west. The north-central region is dotted with hundreds of small lakes.

Agriculture and Minerals. About 83 per cent of the population is rural, and the chief wealth of the state is derived from agricultural pursuits. North Dakota leads all the states in the production of spring wheat, and it is generally first also in the production of flax and rye. Barley, oats and maize are other important grain crops, and the state is noted for its seed potatoes. North Dakota is also numbered among the important livestock states. Its central and western prairie lands, and the thousands of acres of clover afford such excellent pasture and winter feed that dairying is becoming highly profitable. The entire south-west is underlaid with thin beds of lignite coal, little used except for local purposes.

Manufactures. Agriculture furnishes the raw material for the state's two important industries. Flour-milling leads the manufacture of dairy products by only a small margin. Bricks and pottery are also manufactured in quantity.

Government. The first and present state constitution of North Dakota was adopted in 1889. The legislature consists of a Senate limited to fifty members and a House of Representatives of 113 members.

The judicial department consists of a supreme court, district courts, local courts, justices of the peace, and inferior courts. The supreme court is composed of five judges, elected for six years.

NORTH EQUATORIAL CURRENT. See OCEAN.

NORTHERN IRELAND. See IRELAND; LOCAL GOVERNMENT; and ULSTER for a description of the counties.

NORTHERN LIGHTS. The popular name applied to the *aurora borealis* (which see).

NORTHERN TERRITORY. One of the political divisions of the Commonwealth of Australia, situated in the northern half of the continent, between Queensland and Western Australia. The Northern Territory has an area of 523,620 sq. miles, but apart from the 20,000 uncivilized aborigines, it has a population of only about 4800, two-thirds of this number being white, and the remainder Asiatics.

DARWIN, the capital, is situated on the northern shore, and has a deep, spacious harbour. The town is built 80 ft. above high-water mark and overlooks the harbour.

The northern part of the Territory consists largely of a tableland, having great areas of natural pasture where 780,000 cattle and

smaller numbers of sheep, horses and pigs graze. The southern areas are sandy and arid, but in the future may be made suitable for agriculture by the abundance of artesian waters. There is a six months' wet season starting in November, and continuing to May.

The country is rich in minerals, as yet little developed. Tin, gold, mica and copper are mined, and tungsten and other metals have been found. See AUSTRALIA.

NORTH GERMAN CONFEDERATION.

See GERMANY (History); also BISMARCK.

NORTH ISLAND. The smaller of the two New Zealand islands. See NEW ZEALAND.

NORTHMEN, THE. This was the general name for the Danish and Scandinavian adventurers who, for a few centuries, proved a plague to the wealthier races. They were hardy sailors, but their open dragon-ships were meant primarily for coasting and for river-work, nor could the oars be used in too rough a sea. They therefore spent the winter at home, and set out in the spring on cruises which were essentially business trips, trading where the folk they visited were strong, plundering where they were weak or unprepared. The spirit of adventure led many of them far afield, for they not only raided the Atlantic seaboard but made themselves dreaded in the Mediterranean. They even reached "Micklegarth"—the Great City, Constantinople—where they constituted the Varangian bodyguard of the Greek Emperor. Some went East along the Baltic and up the great rivers of Russia; another expedition explored westward from Iceland to Greenland and America. As time went on, in many places they came to conquer rather than to harry, bringing their families with them. Their most adventurous period was the eighth, ninth, and tenth centuries; the last great Viking was the gigantic Harold Hardrada of Norway, who was killed at Stamford Bridge in Yorkshire in 1066. Wherever they settled they brought fresh blood and vigour to the country, although too often they hammered a civilization back to barbarism, as they did in Northumbria. Perhaps the most remarkable result of their activities was the blending of Norse energy and Gallic intelligence into the Norman race, which had so stirring an effect on the destinies of Europe.

NORTH POLAR EXPLORATION. See POLAR EXPLORATION.

NORTH SEA (once known as the GERMAN OCEAN): A division of the Atlantic Ocean which lies between Great Britain and the continent of Europe. It is nearly 700 miles from north to south and about 400 miles wide. It has a sea-coast of 4000 miles and its area is about 220,000 sq. miles, although a total of 2500 sq. miles of this space is

occupied by islands. The depth varies from a mean of 100 ft. at the south to 400 ft. at the north and 250 ft. in the centre, with a maximum of over 2400 ft. at the entrance of the Skagerrak. On its shores are the harbours of the greatest seafaring nations of the world, Britain, Germany and Norway, as well as those of Belgium, Holland, and Denmark. The waters of the North Sea mingle with those of the Atlantic and Arctic oceans; the Skagerrak, an arm of the sea, connects with the Kattegat and leads through to the Baltic Sea. The Kiel Canal also offers communication between the two seas, while the English Channel forms the southern link with the Atlantic.

The chief large rivers which flow into the North Sea are the Humber and Thames of Great Britain, and the Rhine system, Elbe, Weser, Ems, and Scheldt of the Continent.

Its position as a sea among seas causes the tides to be unusually confusing. Two tidal waves enter: one arrives from the Atlantic through the Strait of Dover and the Channel, sweeping northward along the east coast, and another comes from the north, moving with greater speed southward across the Norwegian Channel, and thence to the Danish and English coasts. The meeting of the two tides causes the high tides of the Thames and the Wash, and on some coasts, where the two tides come together, a difference of 20 ft. between high and low water results.

The North Sea is one of the world's most productive fishing grounds, herring, cod, haddock, plaice, etc., being taken.

NORTH STAR, or POLE STAR. A star of the northern hemisphere. No matter where

the North Star. It is easily located from two stars in Ursa Major, or Great Bear, "the Pointers," which are in line with it. The star is about one degree from the celestial pole, and is the brightest star in the constellation Ursa Minor, or Little Bear. It is of the second magnitude. The Greeks called the pole star Cynosura, or "dog's tail." Our word *cynosure* is used to-day to mean "centre of attraction." See ASTRONOMY, STAR.

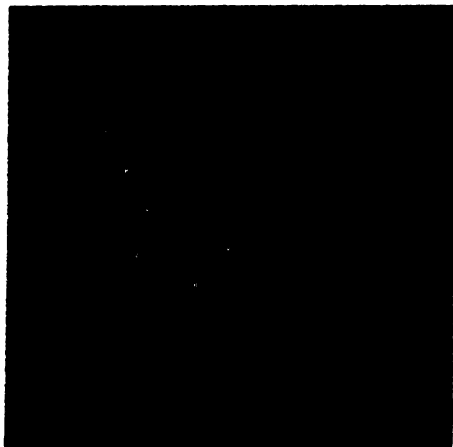
NORTHUMBERLAND. The extreme north-easterly county of England, with an area of 1,291,978 acres and a population in 1931 of 756,723.

Physical Features and Scenery. Apart from the extreme south-east, which has been disfigured by coal workings and industrial expansion, the county is relatively undeveloped and the scenery unspoilt. In many districts, in fact, the population is the scantiest in England, and thousands of acres of moorland in the west are desolate and unworked. By contrast, the area surrounding Newcastle, and extending eastward as far as Tynemouth, and westward as far as Newburn, is one of the most densely populated areas of the country.

In scenery it has been held that Northumberland has the quality of a Scottish rather than an English county. Of the north-west this is undoubtedly true, where the principal physical feature is the range of the Cheviot Hills. From south to north some of the principal heights are Caplestone Fell, 1555 ft.; Mid Fell, 1831 ft.; Lime-stone Knowe, 1801 ft.; Deels Hill, 1025 ft.; Bloody Bush Edge, 2001 ft.; and the Cheviot, 2676 ft. The Northern Pennines are contiguous with the Cheviot Hills and form a rough boundary between Cumberland and Northumberland. To the north the land falls away sharply to the valley of the Tweed, but to the east the slope is more gentle. The eastern half is occupied by a coastal plain which rises gently to the foothills of the mountains, and contains most of the cultivated portion of the county.

The scenery of the western hills is wild and picturesque, and alternates between peat bogs and heather moors with deep ravines, through which flow mountain torrents, feeding the waters of the Tyne, the Coquet, and the Till.

Of the rivers, the North Tyne rises at a number of springs in the southern Cheviots, and flows south-eastward to a point above Hexham, where it is joined by the South Tyne. Its principal tributary is the Rede. The South Tyne rises in the Pennines outside the county and flows north to Haltwhistle, then east to its confluence with the North Tyne. The combined stream flows east into



HOW TO FIND THE NORTH STAR

one may be in northern latitudes, the direction north may be found by reference to

the North Sea. The Coquet flows generally east into Alnmouth Bay. The Tweed forms the north-eastern boundary from Carham to Berwick. Its principal tributary is the Till, a river with one of the most tortuous courses in England.

Communications. The principal railway is the L.N.E. and the principal railway centre is Newcastle, which is on the main east coast route from London to Edinburgh. Another main line from Newcastle gives direct communication with Carlisle. Roads are generally good in the east, but do not reach such a high standard in the western highlands.

History. There is ample evidence of an extended and intensive prehistoric colonization. Little is known of the British tribe in possession at the time of the Roman occupation. In the first Roman invasion Northumberland remained untouched, and it was not until some time after the second invasion that Roman influence was felt. The first definite evidence is of a rapid advance at the beginning of the second century A.D., and of the building of Hadrian's Wall. After the evacuation by the Romans, a period of greater chaos followed than in most parts of the country.

By the sixth century the independent kingdom of Bernicia had been established, with its capital city at Bamburgh. In the following century Bernicia was merged into the kingdom of Northumbria. Danish influence was never firmly established, and the princes of Northumbria remained virtually independent. The Norman occupation was not effected without considerable bloodshed, and the rule of the barons seems to have been particularly oppressive. At this time the county first became known under its present name.

The history of the eleventh to fourteenth

centuries is largely that of border warfare. In the Wars of the Roses the Lancastrian cause was espoused. Recent years have witnessed the rapid growth of the industrial south-east, and a more gradual agricultural development in the coastal plain.

Agriculture and Industries. The conformation of the county has hindered successful agricultural development, and to-day only one-half of the total area is cultivated, and of that less than a quarter is arable.

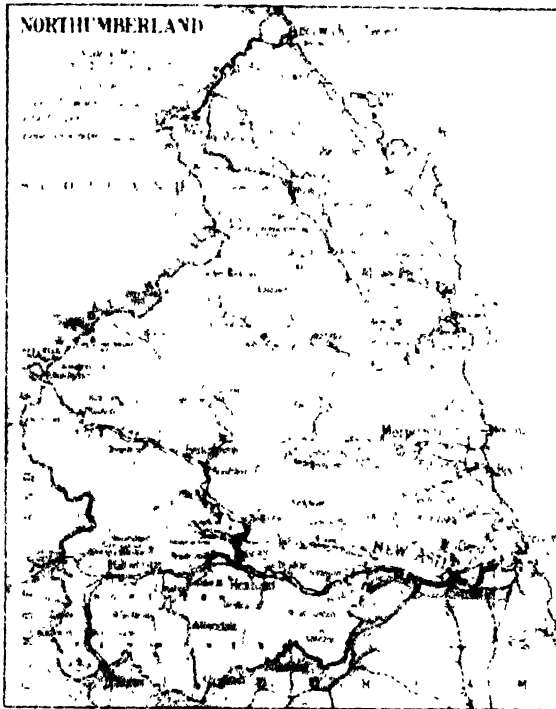
Wheat is not extensively cultivated and the principal crops are barley and oats. Of increasing importance is market gardening. Root crops, of which potatoes and turnips are the chief, are profitably cultivated. The county is principally known, however, for sheep-rearing, and huge flocks graze on the lower slopes of the Pennines and on the Cheviot Hills.

The mineral wealth is in the coal deposits. These are centred, with one small exception

in the south-east, and have been responsible for the growth of Newcastle. The coal-mining industry has resulted in considerable industrial activity. Newcastle remains one of the principal manufacturing centres of England, and in addition is a port of the first magnitude.

Chief Towns. The county town is Newcastle (which see). The towns of Berwick-on-Tweed, Tynemouth, and Wallsend are also described in separate articles.

Alnwick (an'ik). Urban District with an area of 4778 acres, and a population in 1931 of 6883; situated on the River Aln. Its principal features of interest are the castle, abbey, priory, and parish church. The castle boasts a foundation prior to the Norman Conquest. It passed into the Percy family in the fourteenth century, and contains examples of every style of architecture from





NORTHUMBERLAND

1. Bamburgh Castle. 2. Looking up the valley of Harthope Brook to the Cheviot (*left centre*).
3. Hexham Abbey Church, mainly Early English work; it stands on the site of a church founded in the seventh century. 4. Blanchland.

: Frith; Taylor

the early Norman type onward. The abbey dates from the twelfth century.

Blyth. A Municipal Borough with an area of 6277 acres and a population of 32,026, in 1931, situated at the mouth of the River Blyth. It is a port and industrial town.

Hexham. An Urban District with an area of 5932 acres, and a population of 8956 in 1931, situated near the confluence of the North and South Tyne rivers. This is one of the most ancient towns in the north of England and was founded at least as early as the seventh century. Its earliest name was Hagustald, and it became, with Lindisfarne, the see of one of the two bishoprics of Bernicia. It has an abbey church, founded in 673, though the present building dates to the thirteenth century.

Morpeth. A Municipal Borough, with an area of 2216 acres and a population of 8807 in 1931, situated on the fringe of the coal-field and interesting chiefly for the fragmentary ruins of the castle, which is probably of Norman foundation.

Antiquities. Northumberland is perhaps richer in antiquities than any other English county, stone circles, hut circles and camps belonging to the prehistoric period are frequent. Camp sites of the British period occur on many of the hill-tops, especially at Dod Law and Rowing Linn. A stone circle on Grindon Rig is incomplete, but one of the finest of its kind. The five stones which remain are of exceptional size. Another well-known megalithic monument is the "Mare and Foal" near Haltwhistle. Of the Roman period there is substantial evidence. First in importance is the Roman wall, stretching from Heddon-on-the-Wall westward to the boundary of Cumberland near Crooks. Of the forts placed at intervals along the wall several can still be traced, especially near the village of Housesteads (Borcovicium). The Saxon remains are scanty, but there are many important ruins of medieval monastic houses. These include the Abbeys of Lindisfarne and Tyne-mouth. Hulne Priory is the only notable Carmelite house now extant. The ruins of Norman castles are plentiful.

NORTHUMBERLAND, DUKES AND EARLS

OF. At the time of the Conquest the Saxon Earldom of Northumbria was held by Morcar, brother to Edwin of Mercia. On the revolt in 1068 the brothers' earldoms were broken up. William granted the Earldom of Northumberland to Copsi or Copsige, who had previously acted as deputy to Tostig Godwinsson, Earl of Northumbria. Copsi drove out Oswulf or Osulph, Morcar's deputy. Oswulf collected his forces, fired Newburn Church, in which Copsi had taken sanctuary, and slew him. William then

appointed a Norman, Robert of Comines, who was slain in the burning of the Bishop's house at Durham, where he had taken refuge from insurgents. In 1069 a Saxon earl was created, Cospatrick, son of that Maldred from whom was descended the great House of Neville (see SALISBURY, EARLS OF; WARWICK, EARLS OF; and WESTMORELAND, EARLS OF). Cospatrick subsequently fled to Scotland, where he took service under Malcolm Canmore; from him were descended the Scottish Earls of Dunbar and March. William I conferred his earldom on Walcher of Lorraine, Bishop of Durham, who was murdered by insurgents at Gateshead in 1080. It is perhaps incorrect to describe the foregoing as Earls of Northumberland; they were rather rulers of Bernicia, the northern half of Northumbria. To their contemporaries they were probably "Earls of Northumbria," or simply "Earls" without territorial addition.

One of the Conqueror's warriors was William de Percy, whose ancestor Geoffrey had settled in Normandy with Hrolf the Ganger (see NORMANDY, DUKES OF). This William, surnamed Algernon or Als Gernons, i.e. William with the Whiskers—who was granted broad lands in the north, died in Palestine on the First Crusade. His great-granddaughter Agnes married Joscelyn de Leuain, a son of the Count of Brabant and a descendant of Charlemagne. He assumed the name of Percy; family tradition says that the famous Blue Lion of the Percy coat is the old blazon of Brabant, but heraldry was not yet a science in the twelfth century, and the Blue Lion is said to have first appeared in the reign of Edward I. The family increased in power. Richard de Percy was one of the twenty-five guardians of Magna Carta. Henry de Percy in 1309 obtained Alnwick, which became one of the greatest castles of the north. A later Henry fought at Crécy and married Mary of Lancaster, whose grandfather had been the son of Henry III. Of their children, Henry was created Earl of Northumberland and Thomas, the younger, Earl of Worcester.

The eldest son of Northumberland was Henry, surnamed *Hotspur*, from his impetuous courage. One of the most famous warriors of the day, he acted as Warden of the Marshes and fought repeatedly against the Scots, and especially against the family of Douglas. These two great Houses were sometimes at war when the countries were formally at peace. The ballads of Chevy Chase and of Otterburn give the strikingly divergent accounts, respectively English and Scottish, of one such affray. This battle was fought in the reign of Richard II, although ascribed by the ballad to that of Henry IV.

as each ballad claims a national victory, the contest was probably hard-fought but inconclusive. It is a commentary on the relative strengths of the central governments in England and Scotland that the Percies, although regarded as sovereign lords in the north, never dominated the Crown as the Douglasses were able to do over the Border.

The powerful aid of Northumberland and Hotspur made possible the usurpation of Henry Bolingbroke, who not unnaturally watched them subsequently with a jealous eye; the Percies, who had probably intended him to be a puppet king, thought him ungrateful. In 1402 Hotspur defeated the Scots at Homildon Hill, taking prisoners the royal Earl of Fife and Archibald "Tyne-man," Earl of Douglas. Henry IV demanded the prisoners and so, indirectly, their ransoms, whereupon Hotspur allied himself with his brother-in-law Sir Edmund Mortimer (see MARCH, EARLS OF) and the Welshman Glendower (see GLENDOWER) to dethrone the king. He was defeated and slain at Shrewsbury in 1403; his father made submission, escaped to Scotland, and was slain in a skirmish at Bramham Moor. The family honours were restored to Hotspur's son, and the Percies long continued to dominate the north. Henry, third Earl, was killed by the Yorkists at Towton in 1461. Edward IV gave the earldom to Lord Montague, brother to Warwick the King-maker, but in 1469 made him Marquess of Montague and restored the earldom to Henry, son of the third Earl; this Henry was slain in a rising provoked by the royal taxes in 1489. Henry Algernon, fifth Earl, a proved warrior, was also noted for his learning and piety. Henry Algernon, sixth Earl, in his youth loved Anne Boleyn, to whom he may have been contracted. On his death without issue in 1537 his honours expired, his brother Thomas having been executed for his share in the Pilgrimage of Grace.

Among the ministers of Henry VIII one of the ablest was JOHN DUDLEY (1502-1553), whose father, Edmund Dudley the lawyer, had been made so unpopular by his exaction of taxes, and had been executed in 1510 with his colleague, Richard Empson. Dudley proved useful both in peace and war, and rapidly rose to power. He received monastic lands, was made Viscount l'Isle—his mother's family had held the title—and, on the accession of Edward VI, Earl of Warwick. He suppressed Ket's Norfolk rising against enclosures, intrigued against and supplanted Protector Somerset, and had himself created Duke of Northumberland. The evidence of his creatures brought Somerset to the block. He professed himself an ardent Reformer

and carried out extremist measures unpopular in the country. An able subordinate, he was unfit for great power; he further debased the currency, and England suffered from his rule. On the death of Edward VI he proclaimed Lady Jane Grey (see GREY, LADY JANE), whose husband was his son Guildford. Directly he had marched against the rightful Queen, Mary Tudor, the Council dethroned Jane; his army melted, and he had the meanness to proclaim Mary at Cambridge. He was beheaded on Tower Hill, having tried to win Mary's favour by being reconciled to the Catholic Church.

In 1557 Mary restored the earldom to Thomas, son of the Thomas Percy beheaded in 1537. He and the Earl of Westmoreland led the northern rising of 1569 to restore Catholicism. On its failure he fled to Scotland, was sold to the English government and beheaded at York. His brother Henry, on whom the title was entailed, became eighth Earl. He had fought stoutly against Scots and French, and had not joined his brother rising, but in 1585 he was imprisoned in the Tower, his name having been mentioned by arrested conspirators. His guilt is as uncertain as the cause of his death; the circumstances suggest murder. His son Henry fought against the Armada and in the Fens Countries. He was a patron of the arts and a scientist, his astronomical studies earning him the name of "the Wizard Earl." Robert Cecil was jealous of his power, and the Earl was arrested in 1605, because one of his kinsmen had been concerned in the Gunpowder Plot. He was certainly innocent, but he was fined £30,000 and imprisoned in the Tower, where he continued his studies. After sixteen years he was released by the influence of the Earl of Carlisle, who had married his daughter Lucy. This Lady Carlisle, a noted beauty and wit, was the friend of Strafford and of Pym and an indiscreet participant in the political intrigues of the reign of Charles I; she betrayed the King in 1642 when she warned Pym and four other members of the Commons of their intended arrest. Her brother Algernon, tenth Earl, fought for the Parliament, but opposed the execution of Charles I and promoted the Restoration.

Joscelyn, eleventh Earl, having left no male heir, Charles II conferred the Dukedom of Northumberland on George FitzRoy, his younger son by the Duchess of Cleveland, he died without issue in 1716. Earl Joscelyn's daughter was Lady Elizabeth Percy, who was betrothed to Thomas Thynne of Longleat. In 1682 Thynne was murdered by the followers of Count Königsmarck, whose acquittal caused much scandal. Lady

Elizabeth married Charles, sixth Duke of Somerset, she exercised considerable influence at the court of Queen Anne. Her son Algernon Seymour was created Earl of Northumberland in 1749; his son-in-law, Sir Hugh Smithson, assumed the name and arms of Percy and in 1766 was created Duke of Northumberland; from him the present Duke is directly descended.

NORTHUMBRIA. One of the Anglo-Saxon kingdoms of England. It was formed at the end of the sixth century out of the two independent kingdoms of Deira and Bernicia. The foundation of both these is obscure, but by tradition Ida was the first king of Bernicia, and Ella of Deira.

The combined realm extended over the whole of the country from the Humber north to the line of the Firth and Forth, and during the first half of the seventh century was the most powerful of the Anglo-Saxon kingdoms. It is reputed to have extended its authority over the Isle of Man. Under Oswin, even Mercia acknowledged the suzerainty of the northern power, and the ancient kingdom of Strathclyde was totally subjected. From the beginning of the eighth century the power of Northumbria showed a

decline, which was checked only during the reign of Eadberht, who penetrated beyond the line of the Firth and Forth and extended the kingdom at the expense of the Picts.

In the first years of the ninth century Northumbria gave allegiance to Wessex. In 867, however, the Northumbrian army was totally defeated, and the southern part of the kingdom was severed from it, but it was not until the days of King Alfred that the kingship was finally abolished. Even after that it was re-established for a short time, until the conquest of the north by Edward the Elder. Later it became one of the great Earldoms. The most famous of the earls was Siward, who held the Earldom until 1055. See **NORTHUMBERLAND, DUKES AND EARLS OF**

NORTH-WEST FRONTIER. A mountainous province of India, lying between Afghanistan on the west and Kashmir and the Punjab on the east, with an area of 39,310 sq. miles, of which one-third is British territory and the remainder under tribal chiefs tributary to British authority. The total population is rather over 5,600,000, mainly Mohammedan. Among many languages Pushtu is most in use. About 30 per cent of the area is cultivated—millet and



ON THE NORTH-WEST FRONTIER
A Mohmand village in Waziristan, with watch-towers and terraces of cultivated land

Photo: Central

wheat are the grain crops, especially with the help of irrigation. The higher ground is of little value except for sheep. The chief town and administrative centre is Peshawar (population 121,866), which controls the entrance to the Khyber Pass and the trade between India and Afghanistan; it has railway communication with other parts of India and to the frontier of Afghanistan. The frontier territories were annexed to the Punjab in 1849 and constituted a province in 1901. The tribal territories are under political agents. See **MOHMANDS**.

NORTH-WEST MOUNTED POLICE. See **ROYAL CANADIAN MOUNTED POLICE**.

NORTH-WEST PASSAGE. When Constantinople came into possession of the Turks in 1453, European merchants were deprived of their most convenient route to the East, and the desire to find a new trading route



was for years an incentive to the most daring navigators of Europe. They and their patrons, when they knew that the continent discovered by Columbus was not India, conceived that they would discover a passage enabling them to reach the Pacific and the countries of the Orient.

Such a thoroughfare between the Atlantic and Pacific Oceans, along the north coast of North America, is known historically as the North-West Passage.

As early as 1497, the Cabots sailed from England in an attempt to find a shorter route to the East Indies. They landed near Cape Breton and set up the English flag. The following year, John Cabot's second attempt to find the North-West Passage met with failure when his ships were blocked by ice as they sailed up the west coast of Greenland. He then passed over Davis Strait to the modern Baffin Land. In 1524 Verrazano, sailing under the French flag, made an effort to find this passage. Jacques Cartier, in 1536, discovered the St. Lawrence River, while seeking a new route to China. Henry Hudson, who was sent out by the Dutch East India Company to find a shorter route to the South Seas, thought that he had discovered the opening into the Pacific

when, in 1609, he anchored in what is now New York Bay.

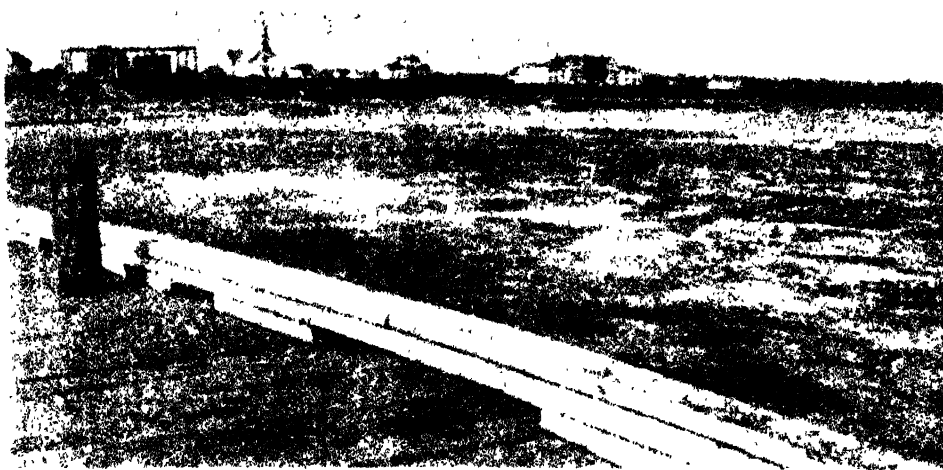
Sir Martin Frobisher began a series of English expeditions in 1576 that were to last nearly three centuries. John Davis made the next attempt, he traversed the Strait that since has borne his name, and in 1587 advanced as far north as $70^{\circ}41'N$. Of still greater importance was the expedition begun in 1616 by William Baffin and Robert Bylot. One of the aims of the Hudson's Bay Company, again, was to find this passage.

In 1818 began the final series of expeditions, when Commander John Ross was sent out in command of the *Isabella* and the *Alexander*. Among the names of the explorers who followed him, the most celebrated is that of Sir John Franklin, who lost his life in the Northern wastes, but was the first discoverer of the passage, for the point reached by his ships brought him to within a few miles of the known waters of North-western America, leading directly to Asia.

In 1850-51, Sir R. Melville from Bering Strait reached Banks Island by ship, and then completed the passage eastward on foot and reached Baffin Bay in one of Sir L. Belcher's ships.

In 1905 Roald Amundsen, the discoverer of the South Pole, made a trip through the passage from the Atlantic to the Pacific in the ship *Gjoa*, passing between the American mainland and the coast islands to Bering Strait. The *Gjoa* was the first vessel to sail through the North-West Passage.

NORTH-WEST TERRITORIES. All that part of Canada, except the Yukon, lying north of, and excluding, the nine provinces; it comprises the Districts of Mackenzie, Keewatin and Franklin. The area is 1,309,682 square miles, approximately one-third of the total area of the Dominion. The population, which was 9723 in 1931, consists of about 4000 Indians, 4700 Eskimos and about 1000 whites and half-breeds. Most of the region is a plain, broken by lakes and rivers, and sloping toward Hudson Bay and the Arctic Ocean. To the north lie the scattered islands of the Canadian Arctic Archipelago, of which only the eastern ones are elevated. Geologically, most of the section belongs to the Laurentian Plateau, but the western part is built of newer rocks, and the Mackenzie Valley has many stretches of alluvial soil. The largest lakes are Great Bear and Great Slave; the principal rivers are the Mackenzie and the Coppermine. Long stretches of the Mackenzie River are navigable in summer, and Hudson Bay and Strait are open to shipping at least in August.



WHARF RESOLUTION, NORTH-WEST TERRITORIES
The R. C. Church and Mission Buildings can be distinguished
Photo: Canadian Official News Bureau

and September. Summer is warm but brief, winter is long and cold. Snowfall is moderate.

Resources. The Mackenzie River basin is heavily wooded with birch, pine, spruce and other species, and the southern part of the Territories generally has a fair sprinkling of trees. To the north, however, vegetation becomes stunted. The islands have a scattered tundra growth, and those in the east some permanent ice sheets. The rivers are filled with edible fish. The chief present asset of the Territories are fur-bearing animals, among which are bears, beaver, otter, mink, and musk-oxen. There are vast grazing grounds for reindeer and musk-oxen. Oil has been found recently in paying quantities, while new discoveries of minerals indicate that the buried wealth of these regions may shortly become the principal source of enterprise.

Water-power resources are important and widely spread throughout the region. There are no towns.

Government and History. The government of the North-West Territories is administered by a branch of the Department of the Interior, and law and order is largely in the hands of the Royal Canadian Mounted Police. The official head of the administration is a Commissioner, who resides at Ottawa.

Until 1869, Rupert's Land and the North-West Territory, then including more than double the area of the present Territories, were



POKIAQ CHANNEL, AKLAVIK (MACKENZIE DELTA)
Photograph taken by moonlight.
Photo: Canadian Official News Bureau

the property of the Hudson's Bay Company, which surrendered its governmental, but not its trading privileges, for £300,000. Between 1869 and 1912, the area of the North-West Territories has been gradually lessened, first, by the creation of the province of Manitoba in 1870, then by the separation of the

Yukon in 1898; next by the erection of Alberta and Saskatchewan into provinces in 1905; and, finally, by the enlargement of Manitoba, Ontario, and Quebec in 1912.



LOG CABINS NEAR FORT NORMAN, NORTH-WEST TERRITORIES

Photo: Visual Education Service

The Territories are not easily accessible, except by the rivers in summer time.

NORWAY. A kingdom in the western part of the Scandinavian Peninsula. It is a narrow strip of rugged country, extending from the Skagerrak on the south to North Cape in the Arctic. Svalbard (Spitsbergen), a group of islands lying in the Arctic, 450 miles farther north, belongs to Norway. The area of Norway is 124,588 square miles.

People. Inhabiting the peninsula at an early age were a people who, living in a land that was largely coast-line, developed the seafaring characteristics of the Vikings. From these ancestors come the modern Norwegians. Survivals of the early picturesque life, customs, and architecture are still met with in the remoter parts of the country.

In no other European country is society so democratic. There are no privileged classes and no orders of nobility. Almost three-fourths of the people live in rural communities along the fiords; there are comparatively few in the interior, and many of the high, bare mountains are wholly uninhabited.

Norway has a population of 2,871,400 (1934), including a few Lapps in the far north.

The Norwegians have emigrated in great numbers in recent years, chiefly to the United States of America and Canada.

The Evangelical Lutheran Church is the established religious body, but all denominations enjoy freedom of worship. The most important of the organizations outside the regular Church are the Methodist and Baptist.

Cities. Nearly all the towns are seaports;

most, being originally built of wood, have at some time been destroyed by fire. In the larger towns stone and brick are now used. The capital Oslo, is described under a separate heading.

Bergen, one of the chief seaports, lies at the head of a fjord on the west coast, with a background of lofty mountains. It is 186 miles north-west of Oslo. The town, founded in 1070, was built of wood, and was several times ravaged by fire. The modern town is built of stone. The rainfall is unusually heavy, averaging annually about 73 in.

Early in the fourteenth century, Bergen became an important member of the Hanseatic League (which see). Its population of 98,303 (1930) makes it the second largest city of Norway.

Fredrikstad (population 14,054) on Oslo Fjord at the mouth of the River Glommen is the principal timber port and has shipbuilding yards.

Hammerfest, the most northerly town in the world, lies 300 miles north of the Arctic Circle. Fishing and Arctic hunting are the chief interests. The population is about 2,000.



HAYMAKING IN A NORWEGIAN VALLEY
Here the hay is dried on wire lines.

Photo: U. & U.

Stavanger, on the south-western coast on Stavangerfjord, is a very old town, built mainly of wood, and it is noted for its export of fish. There are shipyards, machine shops,

cotton factories, and woollen mills. Population, 46,780 (1930).

Sandefjord (population 7000) and *Tonsberg* (population 12,000), both on Oslo Fjord, are the principal whaling ports. Sandefjord has a fine museum of whaling, the best in the world.

Trondheim, a seaport on the west coast. From January, 1930, to March, 1931, it was called by the ancient name of Nidaros. Its Anglo-Norman cathedral is the most impos-

Norway's outer coast-line is 1700 miles in extent, but if the fringed shores of the fjords are measured, it is 12,000 miles—long enough to reach halfway around the world. The fjords are long arms of the sea reaching into the land between high, precipitous cliffs. The entire coast is fringed with numerous islands, about 150,000 in all. In the north these islands are extremely rugged. The Lofoten Islands, lying 100 miles north of the Arctic Circle, form the most prominent



LOOKING OVER THE NORDFJORD FROM HJELLE

Photo: Norwegian State Railways

ing church in Norway, and is the scene of the coronation of Norway's kings and queens. The city has export trade in copper ore, iron and pyrites, wood pulp, timber and fish. Its population is 54,458 (1930).

Tromsø, in Finmark, is the largest town in the north. It is a busy fishing port with some shipbuilding and is a centre of Arctic interests. Population 10,336.

Physical Features. Norway is a rugged tableland of ancient rocks, the coasts of which are indented by hundreds of deep and winding fjords, bordered by steep cliffs. Farther inland are lofty plateaux, or *fields*, some of which carry extensive snowfields and glaciers. Rising from this barren region are lofty, snow-covered peaks. Galdhøpiggen (8332 ft.), in the central part of the country, is the highest peak in Norway. Sheltered by the mountains are narrow lakes, low, forest-clad hills, and strips of grassland.

group. Their lofty, jagged peaks are covered with snow, and their lower slopes are inhabited by millions of eider ducks, valuable for their down. These islands are the centre of the cod fisheries of Norway.

Numerous streams flow along the steep western mountain slopes to the sea, but there are few of economic importance, except for possible water power. Among the largest streams are the Glommen, which flows into the Skagerrak, and the Drammen, having its outlet in a western arm of Oslo Fjord.

The largest lakes include Mjøsa, Randsfjord, Nisser Vand, and Tyri Fjord. About 4 per cent of the area of Norway is occupied by lakes and rivers.

Climate. Norway extends north of the Arctic Circle for about 300 miles, but the cold is moderated somewhat by the Atlantic winds. On the western coast the winters are mild and the summers cool, while in the

interior the winters are extremely cold and the summers comparatively warm. In the region of Oslo, the mean temperature for July is 61°, and for January 25°. In the north there are two months of winter darkness, and in the summer there is no night, daylight lasting from May to August. The North Atlantic Drift, washing the western coasts, keeps the harbours open all the

mountain huts, or *sæters*. The cattle are small, but give good milk, and Norwegian dairy products are exported in large quantities to Great Britain. The small fjord pony and the larger farm horse and sheep are extensively reared. The nomadic Lapps in the north keep herds of reindeer, which serve them as beasts of burden and furnish food and clothing.



NORWEGIAN FJORD AND VILLAGE

Photo U & U.

winter. Rainfall is heavy in the west at all seasons and lighter in the east.

Agriculture and Livestock. About three-fourths of the country is barren and mountainous; forests cover much of the remaining land, leaving only about 4 per cent for cultivation. Oats and potatoes are the chief crops. Barley and rye are also grown, and there is some wheat in the south. The small production of cereals falls far short of the needs of the people. Grass is cut on the slopes and dried on fence-like structures for hay. There has been a steady increase in the number of small farms of from 5 to 25 acres.

Livestock are important. In the mountain pastures, herds of cows are kept during the warmer season by Norwegian women who spend the summer months in the lonely

Over one-fifth of the country is wooded, and timber and wood products are important exports. The forests of the south-west are the chief source of timber, three-fourths of which is pine. Above the belt of firs which encircles the mountains are birch forests. The State owns considerable tracts of the forest land. Many millions of new trees are planted annually.

Fisheries. The waters of the fjords and the coast waters are richer in fish than most seas, and fishing is among the oldest and most important industries. The cod fisheries, the largest of which are in the Lofoten Islands, are the most important; the herring catch is second in value, and mackerel, salmon, lobsters, and sea-trout are caught in large quantities. The fishing *jagts*, boats peculiar to Norway, are being replaced by



APPROACH TO THE BU'AR GLACIER, HARDANGER DISTRICT
Photo: Norwegian State Railways



BODALS GLACIER
Photo: Norwegian State Railways

motor vessels and steamers; bank fisheries have been developed, and the coast industries have been improved and extended. A large Norwegian whaling fleet works in the waters of the South Atlantic. The processes of preserving fish have also been improved, and trade in tinned fish is important.

Mining and Manufactures. Copper and iron ore are the chief minerals. Silver and

of the manufactured articles used in the country.

Transport and Commerce. There are many miles of excellent roads and over 2000 miles of railways. Several lines have been electrified; one of the most remarkable is that between Bergen and Oslo which, in its length of 305 miles, pierces 184 tunnels and rises to 4276 ft. It was opened in 1909. From



VILLAGE ON THE SOUTH COAST OF NORWAY

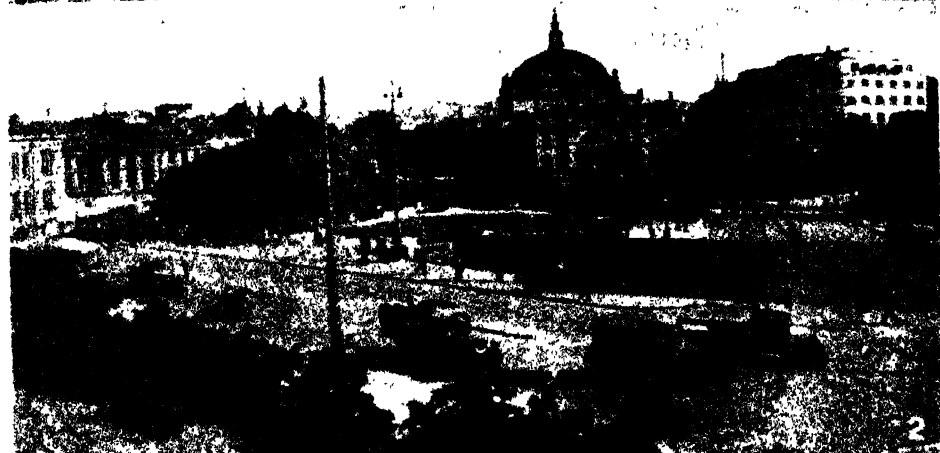
Photo: Norwegian State Railways

nickel are also found, and there is a large production of aluminium. There are immense coal deposits in Spitsbergen, now being exploited by Norway.

Norway, which has been slow in industrial development, is becoming more and more a manufacturing country. In proportion to its size, it has greater water power possibilities than any other country in the world. On the introduction of electrical machinery, plant for the smelting of ores was established, and metal-working and manufacture of machinery have developed. Timber products, including rough timber, furniture, wood pulp and paper, are by far the most important manufactures. Chemicals (especially nitrate of calcium), ships, ropes and textiles are also made, but as yet Norway is compelled to import a large part

Narvik in the north-west a high-level line leads to the Swedish iron mines in Lapland.

Norway for centuries has been famous as a seafaring nation. Norwegian vessels are extensively engaged in foreign trade. For several decades, foreign commerce has been steadily increasing. The cost of imported goods exceeds the value of the national exports, but this loss is offset by the profits from the foreign shipping trade. Norway's largest trade is with Great Britain and Germany, and there is a good deal of commerce with Denmark, Russia, America, Iceland and the Netherlands. The chief articles of export are fish, dairy and timber products and ships, and the principal imports are cereals and other foodstuffs, coal, cotton and woollen goods, hides, hemp, oils and engines.



OSLO

1. The Harbour. 2. National Theatre from the Royal Palace Gardens. 3. The Flower Market.

Photos: Norwegian State Railways

Language and Literature. Dano-Norwegian, i.e. almost pure Danish, has been the business and literary language of the country since the end of the fourteenth century, when Norway was made a part of the kingdom of Denmark. But a recent wave of nationalism, and demand for suppression of long-established Danish influences, gave rise to a new language called *Landsmaal*, which is based on the ancient Norwegian dialect; a movement to make it the official language of Norway has met with success.

The literature of Norway had its beginning

tween the ages of 6 and 14 years. The school system is highly organized, providing, besides elementary instruction, commercial, agricultural and technical education. There are normal schools, a technical high school at Trondheim and a university at Oslo.

Government. Norway is a constitutional hereditary monarchy, having a constitution dating from 1814, with many modifications. Both men and women over 23 years of age are entitled to vote, and women, as well as men, may sit in the National Legislature.

The executive power is vested in the King.



ROYAL PALACE, OSLO

Photo Norwegian State Railways

in the *sagas* and the songs of the *skalds*, or early bards. Remnants of these songs and poems are preserved in the *Edda* of Icelandic literature. During the period of union with Denmark (1380-1814), Norway had no separate literature. The first great poet of modern Norway was Henrik Wergeland (1808-1845). Asbjørnsen (1812-85) and Moe were responsible for the revival of the old folk songs and popular ballads in the nineteenth century.

To the later period of modern literature belong the greatest of Norwegian writers, the poet and novelist Bjørnstjerne Bjørnson, and the dramatist Henrik Ibsen, whose plays have won international fame. Among noted writers of the present age are Jonas Lie, Alexander Kielland, Arne Garborg, Knut Hamsun, and Sigrid Undset. The last two won the Nobel Prize for Literature in 1920 and 1928, respectively.

Education. Education is compulsory be-

and his Council of State, consisting of the Minister of State and eight Councillors.

The legislative power belongs to the *Storting*, a representative assembly of the people, which is elected every three years and meets annually. The *Storting* is divided into two Chambers, the Upper, or *Lagthing*, consisting of one-fourth of the members, and the *Odelsting*, or Lower Chamber, in which all Bills originate. A Bill passed three times over the King's veto becomes law.

History. The early history of Norway turns about the life of the Vikings. The monarchy was founded by Harold I, the Fair-Haired, who in 872 united under his rule the several tribes of the country which had been controlled by *jarls*, or petty chieftains. In the next two centuries, Christianity was introduced by the Vikings—who in their wanderings had come into contact with Christian nations—and in the eleventh century was made the religion of the entire

country by Olaf, the patron saint of Norway. Under Haakon the Old (1217-1263), the kingdom reached the height of its power, and colonies were founded by Norsemen in Iceland and Greenland and on the Shetland Islands. In 1319, there being no immediate heir to the throne, the crown was given to Magnus Eriksson of Sweden, a son of Haakon's daughter, and since that date, Norway has not had a Norwegian king. The next ruler, Haakon VI, married Queen Margaret of Denmark, who, on the deaths of her husband and son, became the sovereign of both Norway and Denmark. By the union of Kalmar in 1397, Norway, Sweden and Denmark were united under her rule. Sweden seceded about 125 years later, but for four centuries Norway was united to Denmark. See DENMARK (History).

At the conclusion of the Napoleonic wars, Denmark, as a punishment for its support of Napoleon, was forced to transfer the sovereignty of Norway to Sweden, as the latter country had been loyal to the allied Powers. The Norwegians refused to accept the Treaty of Kiel (January, 1814), by which the country was ceded to Sweden. They declared their independence and adopted a constitution. Although allowed to keep its own constitution, Norway was compelled to submit to the union. Throughout the nineteenth century, the kingdom insisted upon its rights of independence within its boundaries, and its content with the union increased.

A National State. In 1905, King Oscar's refusal to grant Norway a separate consular service brought affairs to a climax. Norwegian independence was proclaimed, but to show the desire to maintain friendly relations with Sweden, the Storting invited King Oscar to name one of his sons as King of Norway. Upon the refusal of Oscar to accept the throne for his son, Charles, the second son of the Crown Prince of Denmark, was chosen as the ruler of Norway.

After the accession of Charles in 1905 as Haakon VII, democracy steadily developed. In 1909 suffrage was extended to the women paying taxes, and in 1913 all women citizens were given the vote on the same terms as men. Women were also made eligible to sit in the representative body, and on juries and tax commissions. Many other democratic and social reforms have been made. There has been a remarkable reform in respect to the liquor traffic. Under the new system, the profits derived from the sale of liquor are given to the State, and Norway has become one of the most temperate countries of Europe.

In the World War, Norway remained neutral.

Norway has taken a very active part in the

international peace movement, being one of the first countries to recommend the conclusion of arbitration treaties. Unconditional arbitration treaties have been concluded with Sweden and Denmark. Norway is a member of the League of Nations.

NORWAY, MAID OF. See MARGARET OF SCOTLAND.

NORWICH. A city and County Borough, and the county town of Norfolk, with an area of 7898 acres and a population of 126,207 in



NORWICH CATHEDRAL

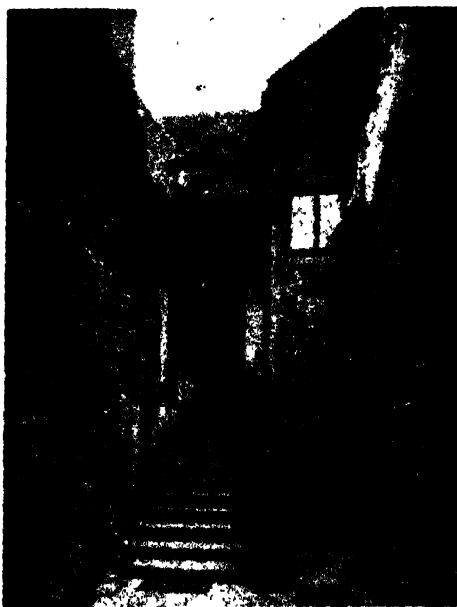
Its greatest glory is the finely tapering spire.

Photo: Norwich Corporation

1931, situated on the River Yare, 115 miles from London, and served by the L.N.E.R. There is a corporation aerodrome.

From the earliest times the city has been of commercial importance. It is a market town, situated in the centre of the North Norfolk agricultural district, and over 100 miles from any city of like size. Brewing and malting have been established for many years, but the primary industry to-day is the manufacture of ladies' shoes, which gives direct employment to over 10,000. Other important manufactures are mustard, starch, rayon, silk dyeing and weaving, steel constructional engineering, electrical machinery, chocolates, crackers, wire netting, clothing, aircraft, etc.

Traditionally, Norwich dates from the pre-Roman period, but the excavations made at Caister appear to disprove that claim. It is



STRANGER'S HALL, NORWICH

Now used as a museum, this house was built in the fifteenth century.

Photo. Norwich Corporation

certain that the town was captured by the Danes in 870, and that it was burned by Danish marauders at the beginning of the eleventh century. After the Conquest, the rebellion of the Earl of Norfolk was centred here. The twelfth and thirteenth centuries witnessed a great influx of Flemish weavers, who introduced the manufacture of worsted and made Norwich one of the most prosperous cities of the Middle Ages. Norwich silk and woollen goods became world-famous.

The modern city retains numerous buildings of historic interest. The cathedral is one of the finest examples of Norman architecture in the country and dates from the year 1096. The castle—the great building that dominates the town—includes the keep of the Norman castle built by Robert Bigod at the end of the eleventh century.

NOSE. "The nose," says one authority on physiology, "is nine-tenths for breathing and one-tenth for smelling." The air enters the nose through two openings or *nostrils*, which are separated by a thin wall or partition of cartilage and bone, the *septum*. The nostrils open into the *nasal passages*, which lead back to the upper part of the throat and permit the passage of air through the pharynx and the windpipe into the lungs. Each nasal passage is lined with mucous membrane, which is covered with minute hairs.

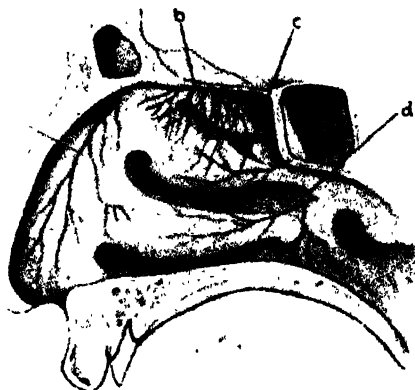


NORWICH MARKET

Photo: Frith

These hairs (*cilia*) catch the dust that is breathed into the nose and prevent its passing to the lungs. In the walls of the nasal passages are coils of tiny blood-vessels, whose function it is to warm the air before it enters the lungs.

The highest part of the nasal cavity is the seat of the sense of smell; it contains a small



CROSS SECTION OF THE NOSE

(a) Branches of nasal nerve, (b) olfactory bulb, (c) superior nasal nerve, (d) inferior nasal nerve.

tract of mucous membrane, in which are distributed the terminal fibres of the olfactory nerve, or the nerve of smell. When the mucous membrane of the nasal passages becomes inflamed, as a result of "catching cold," the sense of smell is affected because the way to the smelling centre is obstructed.

NOTARY PUBLIC (Latin *notarius*, from *nota*, "a mark") An officer authorized by law to attest deeds or writings so that they may be accepted in foreign countries, and to certify copies of legal documents for the same purpose. Notaries are appointed by the Archbishop of Canterbury through the Master of the Court of Faculties, who has also power to strike a notary off the roll. In England no one can, save in special cases, be admitted as a notary unless he has either served as apprentice to a notary or is a solicitor. In colonial appointments, the discretion of the Court of Faculties is unfettered.

NOTATION. Manner in which numbers are represented. Our method of writing numbers, using the nine digits, 1, 2, 3, 4, 5, 6, 7, 8, 9 and zero (0), is called the *Arabic notation*, being derived from that people. We know, however, that the Arabs never laid claim to the invention, but always acknowledged it as the work of the Hindus. To them we owe the symbols and the *place-value* which plays so large a part in all

computations. Leonardo of Pisa (1200) did much to forward the use of this system of numerals, but it took about two centuries after his time for it to gain a foothold. Arabic displaced Roman notation only after a long struggle.

Roman Notation. The Roman notation expresses numbers by means of capital letters, as I, V, X, L, C, D, M. We still retain it in numbering chapters of books, volumes of books, hours on clocks, and for art purposes. The letters, values, and rules guiding their use are as follows:—

I	represents 1.
V	" 5.
X	" 10.
L	" 50.
C	" 100.
D	" 500.
M	" 1000.

1. By placing a letter denoting a smaller number in front of one denoting a larger number, the value of the larger number is decreased, e.g. I in front of X, or IX, denotes 9.

2. When a letter denoting a smaller number is placed after a letter denoting a greater number, the greater number is increased, e.g. II placed after X, or XII, denotes 12.

3. A letter repeated denotes the value repeated; e.g. XXX is 30, CC is 200.

4. Placing a horizontal line over a letter multiplies its value by 1000; as \overline{C} denotes 100,000.

Arabic Notation. Because of the place-value feature of this system, we are able to represent unlimited series of numbers with no more than ten symbols.

The successive places in a number are called *orders of units*. The orders increase from right to left in a tenfold ratio, the first order is units, the second tens, the third hundreds, and so on. In other words, our Arabic, or Hindu, notation is a *decimal notation* (Latin *decem*, ten).

Other Notations. The important point of distinction among the various systems which have existed is the *base* of each system. The Hebrews used the base 10, the decimal base (from fingers on both hands). In the valleys of the Tigris and Euphrates, 60 is found as a *base*, 100 appearing as 60 and 40. Among early peoples of Western Europe is found the base 20 (from the number of fingers and toes); when they reached 20 in count, they *scored* by a mark on the earth, or a cut in wood, or by some manner of mark that would hold the number. We find the *score* (20) common in Ireland and Wales. A survival of the base 20 is found in the French for 80, *quatre-vingt* (four twenties).

NOTOCHORD, *nō' tō kord*. A primitive type of spinal column. See **INVERTEBRATES; ZOOLOGY**.

NOTRE DAME, *nō' tr' dahm*, **CATHEDRAL OF**. A cathedral of Paris, built on an island in the River Seine, in the heart of the city. The story of the cathedral is interwoven with much of the literature and art of France. Several churches have stood on its site, and the present building was begun in 1163.

The style of architecture is early Gothic, and the church is characterized by a stately simplicity and wonderful balance of its parts.

NOTTINGHAM. A city, County Borough and county town of Nottinghamshire, with an area of 16,166 acres and a population in 1934 of 268,850, situated on the River Trent, 123 miles from London, and served by the L.M.S.R. and the L.N.E.R. It is one of the principal industrial towns of the Midlands, its progress in this respect having been facilitated by the proximity of coalfields and ironstone, and by its excellent rail and water communications. Historically, the most important industry is that of lace-making, with which is coupled the manufacture of hosiery. The output of the former has decreased during the present century, and now it has been superseded by the manufacture of cycles, drugs, hosiery, tobacco and cigarettes. Bleaching and dyeing still rank high. Bone glue has been a product of importance for over a century, and is to-day extensively produced in connection with the manufacture of bone fertilizers. The manufactures of men's and women's clothing, leather goods, brushes, gloves and furniture are also flourishing. In addition, engineering works are numerous. The Nottingham Corporation markets are the largest in the county, and were first authorized by Royal Charter in the reign of Henry II.

The earliest recorded name of the town is Tinogshane, which is known to have been an ancient British settlement. In the Saxon period it became Snottingham. After being several times ravaged by the Danes, the town became one of the Danish burghs. The Castle was built by William the Conqueror. Parliaments were held here by Edward III, and Edward IV was crowned king here in 1461.

The first charter was granted in 1155. In 1448 the town was raised to the status of a county, and was created a city in 1897. In 1928 the Mayor was granted the title of Lord Mayor. Four Members are returned to Parliament.

The Castle Rock is to-day occupied by a museum, but there are traces of the ancient castle gateway and of the walls, which were dismantled after the Civil War.

The University College of Nottingham was opened in 1881, and in 1903 was granted a charter of incorporation. The Faculties of Arts, Economics and Commerce and Pure Science, and the Departments of Civil, Mechanical and Electrical Engineering are housed in the new buildings erected in University Park through the munificence of the late Lord Trent. The Departments of Russian, Mining and Textiles, and the School of Law occupy the original buildings in Shakespeare Street. The new buildings include a fine Library housing 50,000 volumes, a well-equipped Refectory with seating accommodation for 500, and an impressive Great Hall.

NOTTINGHAM, EARLS OF. This title has been borne by various houses, including those of Mowbray (see **NORFOLK, DUKES OF**), of Howard (see **HOWARD OF EFFINGHAM**), and of Finch.

Heneage Finch, first Earl of Nottingham (1621-1682). A Royalist lawyer, he was Lord Chancellor from 1675 to his death. He was known for his eloquence and fairness, and as Solicitor-General he scrupulously conducted the trial of the Regicides.

Daniel Finch, second Earl (1647-1730). A lawyer, like his father, and a Tory, he shared in the invitation to William of Orange, wishing for a regency during James' life. As Secretary of State he carried a Toleration Bill for Dissenters and secured the loyalty of the fleet that won the Battle of La Hogue in 1692. A quarrel with Admiral Russell caused him to resign. As the party system crystallized, his importance gradually diminished.

NOTTINGHAMSHIRE. A north midland county of England, with an area of 510,015 acres and a population (1931) of 712,981.

Physical Features. The physical character of the county is dominated by the Valley of the Trent, from which the land rises gradually to the west, north-west and south-east. North of the Trent there is also a general slope from south-west to north-east.

In the extreme west are the eastern spurs of the Pennine Chain. Here there are extensive coal measures, producing a narrow strip of industrial country. The land rises to 589 ft. near Sutton Ashfield and to 629 ft. at Robin Hood's Hill. To the north there is the undulating but poorly wooded expanse of Sherwood Forest, and further north is a thickly wooded area. North of a line drawn from Worksop to East Retford the county forms a continuation of the fenslands of West Lincolnshire. In the south-east the land rises only slightly from the level of the Trent, and includes part of the Vale of Belvoir.

The principal river of the county is the



NOTTINGHAMSHIRE

1. Robin Hood's Cave, where remains of prehistoric man's habitation have been discovered. 2. The River Trent at Blesby. 3. East Retford, the market square. 4. In Sherwood Forest. At one time this covered much of the county; now some considerable portions are preserved between Nottingham and Worksop. 5. Thurgarton Priory Church. 6. Cotgrave.

Trent, which, with its tributaries, drains the entire area. It first flows north-east and then turns north, finally forming the county boundary as far as the southern end of the Isle of Axholme. Its tributaries are the Soar, which forms the south-western boundary from near Loughborough to Trent junction; the Devon; and the Idle.

The finest scenery in the county is probably that of the Trent Valley, which between Nottingham and Newark lies between picturesque wooded hills, and to the north of Newark is bounded by a wide strip of fertile pastureland. The hilly country of the west has in many places been spoilt by coal-mining activities.

Climate. The climate of the county is temperate; the rainfall is less than 25 in. annually, because the prevailing south-westerly winds are driven upward and condensed by the Pennine Chain before reaching Nottinghamshire. The mean annual temperature is approximately 49°. Fog is common in the industrial south-west and especially in the neighbourhood of Nottingham, and occurs occasionally in the marshlands of the north.

History. The history of the county in the earliest times is unimportant. The former marshy state of the Valley of the Trent probably rendered uninhabitable most of the north and some of the east of the county, and the great expanse of Sherwood Forest was equally unsuitable.

At the time of the Roman occupation the whole district formed part of the territory of the Coritani, but of these no large settlements are known, and our only evidence is the remains of hill-top fortresses. Under the Romans some progress was made, and at least one great Roman road was built—the Fosse Way. Along this road there were three military stations—Vernometum, on the site of the present Willoughby; Crococalana and Margidunum, the site of both of which is open to doubt, though the former is commonly associated with Brough.

Similarly, there is little reliable history of the period preceding the Norman occupation. Certain it is that the whole area fell within the Kingdom of Northumbria and later formed part of the central kingdom of Mercia. The Castle Rock at Nottingham was probably first fortified to resist the attacks of the Danes, and eventually the town became one of the five Danish burghs. The Norman Conquest was effected without incident. Development since that time has been rapid.

At three periods the county has figured largely in subsequent history. In the Wars of the Roses, Nottingham was the headquarters of Richard III. In the reign of

Henry VII, it was the scene of Lambert Simnel's Rebellion. The battle of 1489, in which this rebellion was crushed, was decided near Newark. Finally, during the Civil Wars, the town of Nottingham was the centre from which King Charles directed the campaign of 1642, but there was little support for the Royalist cause.

At the present time the county is divided into five parliamentary divisions, each re-



turning one Member to Parliament; in addition, the County Borough of Nottingham returns four Members.

Transport. Historically, the most important means of transport within the county has been the Trent and, to some extent, it retains its supremacy. It is tidal as far as Littleborough, navigable throughout its course, and still carries a heavy barge traffic from Nottingham and Newark. Canal traffic has greatly decreased. The county is served by the L.N.E.R. and the L.M.S.R., a main line of the latter serving Nottingham and Newark. Another main line serves Nottingham and Mansfield. A main line of the L.N.E.R. from Grantham to the south serves Newark and Retford.

Agriculture and Industries. Agriculturally, the county improves from south-west to north-east. Round Nottingham, in the neighbourhood of the coal measures, agricultural pursuits are practically confined to dairy-farming and market gardening, but in other districts the greater portion of the land is under cultivation. The principal crop is wheat, followed closely by oats and barley. The Wolds of the south-east afford sheep pasturage, and there is heavy timber in central districts and the north-west. Industrially, the coal trade is of the first importance. The date of the discovery of the deposits is unknown, but they seem to have been worked continuously since the thirteenth century.

The principal trade of the county is centred in Nottingham. The most ancient manufacture is that of wool, which dates at least from the twelfth century, but was excluded in importance in the Middle Ages by the manufacture of hosiery, in which Nottinghamshire held a virtual monopoly. Hosiery still holds the foremost place, and Nottingham lace has been in great demand for centuries. The manufacture of cotton goods and of clothing, heavy engineering and tobacco manufacture are among the other industries of importance to-day.

Antiquities. Of the prehistoric age, the most important discoveries have been made at Creswell on the Derbyshire border, where, in a series of caves, flint instruments of every description have been unearthed. Megalithic and other monuments are unknown. Similarly, owing to the nature of the country, there are no stone circles of any completeness for where they might have been expected the land has been ploughed. There are, however, a number of camps which belong to the early British period, notably at Retford and Worksop. Of the Roman period the Fosse Way is the principal memorial. The Retford camp was also fortified by that people. The principal Norman castles are those at Nottingham and Newark.

Chief Towns. The county town is Nottingham (which see). The borough of Mansfield is also described in a separate article.

Last Retford. A Municipal Borough with an area of 4657 acres and a population in 1931 of 14,228, situated on the River Idle. It is of some historic importance and was incorporated by charter as early as the twelfth century. It is now chiefly notable as a market town.

Newark. Municipal Borough with an area of 3364 acres and a population in 1935 of 19,535, situated at the confluence of the Devon with the Trent. It was of importance in ancient times from its position at the crossing place of the Great North Road and

the Fosse Way. A special feature of interest is the ruin of the castle, a twelfth-century building, which was long a residence of the bishops of Lincoln. In history it is known as the foremost stronghold of the Royalist cause in the Civil Wars. The parish church, which is one of the most impressive of the Midlands, contains considerable Norman work, with additions made between the twelfth and seventeenth centuries.

NOUMEA, nu' mea. See NEW CALEDONIA.

NOUN. A word that names any object, substance or idea. The word itself comes, in fact, from the Latin for "name"—*nomen*.

Classes of Nouns. The two great classes into which all nouns are divided are *common nouns* and *proper nouns*, the former referring to a class of things. If we single out a special object, place, or thing in each of these classes and give it a name that sets it apart from the rest, such a name will be a proper noun.

Concrete and Abstract Nouns. Common nouns are subdivided into three classes—concrete, abstract and collective.

A *concrete noun* is the ordinary common noun naming a class of tangible objects—things we can see and handle. An *abstract noun* names some quality, action or state considered in a detached way, e.g. blueness.

Collective Nouns. The third sub-class of common nouns covers those which, though singular in form, signify a group of things or persons; as *swarm, flock, crowd, class, family, audience*.

Nouns by Use. Any word belonging to any part of speech, as well as any figure, letter or symbol, may be used as a noun. For example: The *poor* are only they who feel poor.

The *properties* of nouns include Number (singular and plural) and Gender (masculine, feminine and neuter). See GENDER, NUMBER.

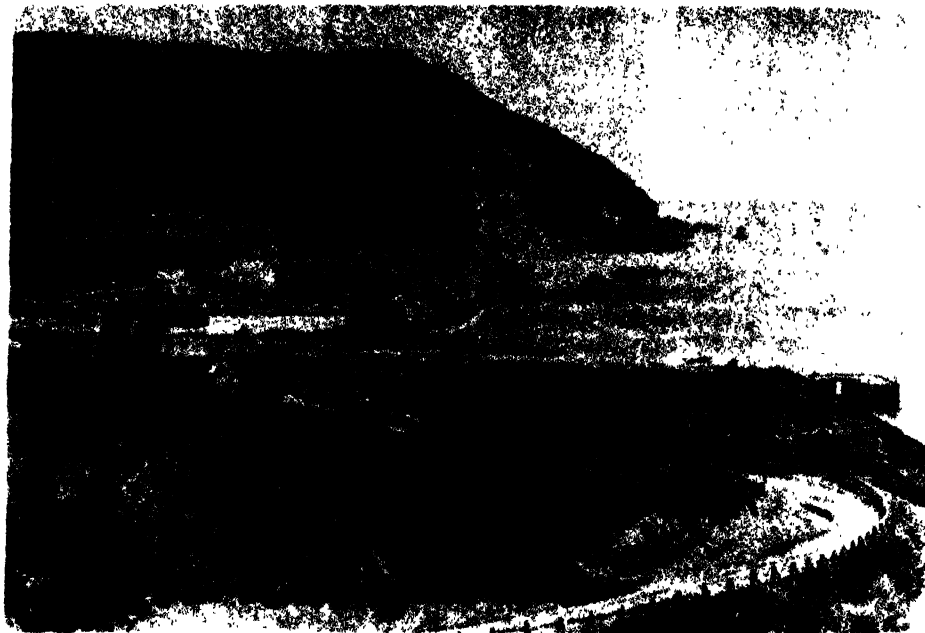
NOVA, ne' va. See STAR.

NOVA SCOTIA. The south-eastern province of the Dominion of Canada. It is the old *Acadie* of the French. With New Brunswick and Prince Edward Island, it constitutes the group known as the Maritime Provinces, area 21,428 sq. miles. Early settlers came from France and from Scotland, and when the English colonies in America waged their war for independence, many loyalists emigrated from them to Nova Scotia. The present population consists of descendants of these early families, and of English families who came to the province at a later date. According to the census of 1931 the population was 512,846. The chief towns are Halifax (population 59,275) and Sydney (population 23,080). Halifax has shipyards, a grain elevator, and cold storage plant, and is a naval station. Sydney is a coal port with iron and steel works.

Surface and Drainage. Three ranges of hills extend through the province from south-west to north-east, their direction showing them to be a part of the Appalachian system. One of these ranges extends along the centre of the peninsula. Another, the North Mountains, borders the Bay of Fundy, and the third, or Cobequid Mountains, extends along the northern shore of Minas Basin. The main part of the province is an undulating plateau with an altitude of about 400 ft. in the south-west, but rising to nearly

The oak, maple, and birch are common among the hardwoods, and the hemlock, spruce, and tamarack among the softwoods. Moose, deer, rabbits, and partridge are found in the less densely populated regions. The lakes and streams abound in fish. Fox farming is becoming a paying industry.

Minerals and Mining. The coalfields yield bituminous coal of excellent quality. The output in 1933 was about 3,600,000 tons. Iron ore is abundant but little mined. Gold is found in paying quantities in various



CAPE BLOMIDON, KING'S CO., NOVA SCOTIA
Photo Canadian Official News Bureau

1000 ft. in Cape Breton. The north-west coast is deeply indented; the Atlantic coast contains a number of inlets which form good harbours, the most important being at Halifax.

The rivers are short and small. There are over 400 small lakes in the peninsula, the largest being Lake Rossignol in the South.

Climate, Plants and Animals. Nova Scotia, owing to the influence of the ocean, has a milder and more even climate than lands to the west. The mean temperature for the winter is 27° F., and for the summer 65°. The annual rainfall, including snow, is 45.6 in. The regions along the coast are subject to heavy fogs.

Originally, Nova Scotia was covered with forests, and these are still found on land that has not been cleared for tillage or for lumber.

places, but the veins are now nearly exhausted. Gypsum is fairly abundant.

Products. The Nova Scotia fisheries are the most extensive in the Dominion, excepting those in British Columbia. Both bank or in-shore and deep-sea fishing are carried on. The most important catches are cod, lobster, mackerel, herring, and haddock. Salmon are taken in large quantities offshore and in the rivers. The industry gives employment to about 25,000 men. Most of the fish and fish products are exported to Great Britain.

There are over 12,000 sq miles of forests in the province, and lumbering is one of the important industries. The pine is nearly exhausted, but spruce, hemlock, fir, and hardwoods are still plentiful.

The soil in the valleys is very fertile, and in places along the coast of the Bay of Fundy

and Minas Basin, where salt marshes were reclaimed by the first settlers, the soil is especially suited to growing hay and fodder.

Potatoes and root crops are also valuable, and oats, wheat, buckwheat, and barley are the most important grain crops.

Livestock and dairying are receiving increased attention. The climate and soil are especially adapted to these pursuits, and the value of dairy products is increasing

Glasgow. Some cotton and woollen goods are made, and lumber and wood pulp are manufactured. The streams furnish an abundance of water-power. The total number of industrial establishments is over 1400 and they employ over 16,000 persons.

Transport and Commerce. The extensive coast-line, with its numerous good harbour sites, gives Nova Scotia special advantages for shipping its products. The harbours on



ON LAKE ROSSIGNOL, NOVA SCOTIA

Photo: Canadian Official News Bureau

from year to year. There are many creameries now in operation.

Nova Scotia is especially adapted to the growing of apples, and there are fine orchards in the Annapolis Valley. On an average, about 2,500,000 barrels are produced annually. Only a small percentage of the land available and suitable for fruit-growing has been set into orchards. Cherries, cranberries, plums, and small fruits are also successfully grown, most of the crop being tinned for shipment.

Manufactures. The manufacture of iron and steel is increasing. Nova Scotia has natural advantages for its development—in coking coal, limestone and iron ore in New-foundland. There are blast furnaces at Sydney, mines and rolling mills at New

the Atlantic coast and the Bay of Fundy are open throughout the year. There are about 1420 miles of railway in the province. The chief exports are apples and other agricultural products, fish, lumber, coal, and iron and steel. The imports consist of manufactured goods, especially textiles and clothing. Most of the foreign trade is with Great Britain and the United States.

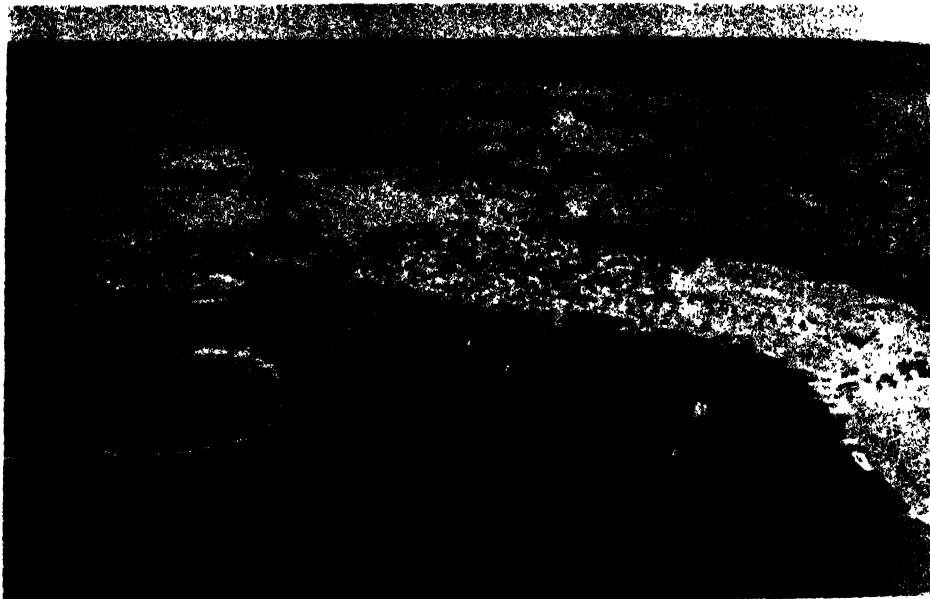
Education. The schools are free and undenominational. A strict compulsory education law is in force, and there is a high school or academy in every county in the province. Besides the agricultural college at Truro, there is a Technical College at Halifax, with branches in all industrial centres. The chief Universities are Dalhousie (undenominational) at Halifax; Kings College (Anglican),

affiliated with Dalhousie; Acadia at Wolfville; and St. Francis Xavier (Roman Catholic) at Antigonish.

Government. The official head is a Lieutenant-Governor, who is appointed by the Governor-General of the Dominion in Council. There is a responsible cabinet. The legislative department was reconstructed in 1928, and the legislative council, or senate, ceased to exist. There is now only a House of Assembly; its members, thirty in number, are elected for five years. The chief executive

de Monts, Champlain, and others. This settlement, removed the following year to Port Royal, is the oldest settlement by Europeans in British North America.

The territory comprising New Brunswick and Nova Scotia was granted De Monts under the name of *Acadie* (Acadia). While the country remained in the possession of France, Annapolis Royal was the chief centre of French influence. During the French occupation, the New England colonists made a number of attempts to gain



FISHING BOATS IN THE HARBOUR AT LUNenburg

These boats fish on the great fishing banks which, beginning off the American coast some 230 miles to the south west, join with the Grand Banks of Newfoundland, 600 miles to the east

Photo Canadian Official News Bureau

is the Premier, who is at the head of the Cabinet. The affairs of each county are managed by a county council elected by the people. The province is represented in the Dominion Parliament by twelve members in the House of Commons, and ten in the Senate. The franchise is granted alike to men and women.

History. In 1497 John Cabot may have landed on Cape Breton Island, and it is supposed that the Portuguese navigator Cortereal explored the coast in 1500. Verazano, Cartier, and other French explorers learned of the country early in the sixteenth century, and French fishermen frequented the waters off the coast during this time. The actual history of the province, however, began in 1604, when the first settlement was made on the island of Saint Croix by Sieur

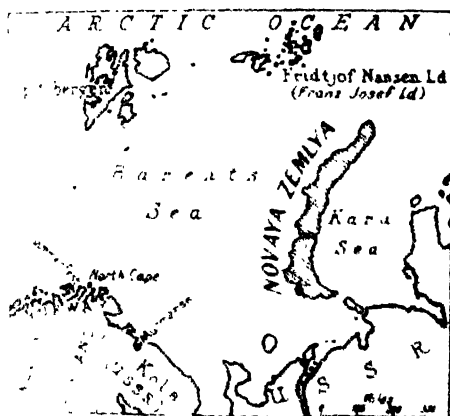
possession of the country. In 1621 Sir William Alexander obtained from James I a grant of the entire territory of Acadia, which he renamed *Nova Scotia*. The Treaty of Breda (1669), however, ceded it to France.

For the next forty years and more, the French were left in undisputed possession of the country; then, in 1710, Port Royal was taken by Colonel Francis Nicholson, and the Treaty of Utrecht (1713) gave the territory to Great Britain, except Cape Breton, which was ceded in 1763. The fortress of Louisburg on Cape Breton, which was considered the strongest of its kind in America, was captured by the English in 1745 and in 1758. The British had resort to drastic measures in order to destroy French influence, and they deported about 6000 French-Acadians in 1755, scattering them

through the colonies from Massachusetts to Georgia.

Up to this time, the colony was in the hands of the Governor appointed by the King. In 1758 a constitution providing for an elective assembly was granted, and Cape Breton Island and Prince Edward Island joined Nova Scotia in 1763, but in 1770 Prince Edward Island was separated from the province. In 1773 Scottish immigration began, and following the Revolutionary War in the United States, the province received a large number of loyalists from that country. In 1784 New Brunswick and Cape Breton were separated from Nova Scotia, but in 1820 Cape Breton was again annexed. Nova Scotia became a province of the Dominion of Canada in 1867. See CAPE BRETON ISLAND.

NOVAYA ZEMLYA. Two islands in the Arctic Ocean, belonging to Russia and forming a part of the government, or province, of Archangel. The northern island is about 20,000 sq. miles in area, and the southern



about 15,000 sq. miles. Together, therefore, they cover an area greater than that of Ireland. The climate is similar to that of Northern Russia and Siberia, and colder than that of Spitsbergen. The coasts of these islands are broken by numerous fjords, and the islands are rocky and barren, with numerous glaciated mountains, 2000 to 4000 ft. high. Innumerable waterfowl are found along their shores, and in the coast waters are seals, dolphins, walruses, and whales. On land are the fox, lemming, and reindeer. Vegetation is represented chiefly by stunted growths of mosses, lichens, and grass. Minerals, by considerable quantities of coal and less of gold and copper.

Attempts have been made to establish permanent settlements, and villages have been set up near the hunting grounds to encourage Samoyed hunters to remain all

the year round. The Soviet government maintains several meteorological stations.

NOVEL. This name (from Latin *novus*, "new," Italian *novella*) originally denoted a story which might be either poetry or prose and of any length. In modern usage, a novel is a long narrative in prose, having a definite plot, and with types of character, manners, and customs depicted with an attempt at truthfulness. The development of the modern novel has been a matter of several centuries.

For the beginnings of the novel one is sometimes referred to a writer of the second century B.C., a certain Aristides, whose humorous sketches of life in his native town of Miletus have not survived, but were imitated by later Greek and Latin writers. In the second century A.D. the *Vera Historia* of Lucian and his *Lucius*, or the *Ass* have some characteristic features of the novel, and in Latin literature *The Golden Ass* of Apuleius, and still more, the *Satyricon* of Petronius approach modern fiction. Mention should also be made of *Daphnis and Chloe*, a sixth-century work, supposed to have been written by a Greek named Longus.

But it is to Italy more than to any other country that we are indebted for the modern novel. As early as the end of the thirteenth century, an anonymous collection of tales was in existence, the *Cento Nuvole Antiche*. About 1339 Giovanni Boccaccio wrote his *Filocolo*, and, later, his more famous *Decameron*. Later Italian writers of *Novelle* are Sacchetti, Masuccio, and Bandello.

A quite distinct stream of fiction which ultimately flowed into the modern novel was the medieval romance, in verse or in prose. In the Middle Ages, tales in verse were by far more popular than those in prose. Gradually, however, the change came; long poems, which told of the deeds of the great heroes—Charlemagne, King Arthur, Roland—began to give place to prose romances which dealt with those same personages, or with frankly mythical characters. These early attempts at fiction have little resemblance to what is at present known as the novel, for they laid no stress on character delineation, and often the course of the action was so overlaid with moralizing, fine word-painting, and description that the plot seemed a minor matter. Chaucer is often considered as a poet only, but he had a very real influence on the development of the novel, for the *Canterbury Tales* and his *Troilus and Criseyde* are among the finest examples of medieval fiction.

It was the printing press which finally determined that the prose story rather than the verse tale should survive; for prose offered decided advantages over verse as a means of expression, and when it could be

preserved in print instead of by word of mouth, little reason existed for holding to the older, more formal manner. Romances



MR. PICKWICK ADDRESSES THE CLUB
Courtesy: Chapman and Hall.

of adventure became more and more numerous and popular, and the ideas set forth in them became more and more overdrawn and sentimental. Against these romances of chivalry, Cervantes directed his masterly *Don Quixote*, which was so successful that the production of that form of fiction practically ceased. *Don Quixote* was more than a satire on contemporary romances; it was a vivid portrayal of character.

It is impossible here to deal with the novels of every European country—the field is enormous. During the Elizabethan Age in England, romances were produced, but the spirit of the age found the drama a more fitting expression, and it was not until the eighteenth century that fiction in England began to have an important place. Once established, however, it easily dominated other forms of literature. John Bunyan possessed to a high degree the story-teller's gift, and he had, too, the art which made his story seem true. In 1719 there appeared a book which was purely a work of fiction—and a masterpiece of realism; this book, *Robinson Crusoe*, by Daniel Defoe, is usually accounted the first in the long line of English novels. His other works had all the art and realism of the first, but no one of them equalled it in interest. Swift published his *Gulliver's Travels* in 1726, but this work is a satirical romance rather than a novel.

The next great English novelist was Samuel Richardson, whose *Pamela, or Virtue Rewarded*, written in the form of letters, was received on its publication in 1740 with the greatest enthusiasm. Two other novels by the same author, *Clarissa Harlowe* and *Sir Charles Grandison*, were written in the same form. They all possessed clear, definite character analysis, one of the most important requirements in any novel; further, they each had a love story to tell. According to some authorities, Richardson's are the first novels in the complete sense of the term.

Distinctions in the kinds of novels were noticeable from the very first; some laid emphasis on character, some on a delineation of manners, while some depended for interest wholly on a plot, and these distinctions became more and more marked. Among authors of the novel of manners, Frances Burney was the first to win notice, while Jane Austen brought the type to a point of perfection which has never since been surpassed. Mrs. Radcliffe and Horace Walpole were early members of what has been called the "skeleton-in-the-cupboard" school, that is, they dealt in all sorts of ghostly horrors. At length the romance began to take an historical turn, Jane Porter having produced a really excellent historical novel in *The Scottish Chiefs*. Foremost among



OLIVER TWIST ASKING FOR MORE
Courtesy: Chapman and Hall.

writers of this class in his own and future times was Scott, whose imitators were numerous.

Charles Dickens, however, was not one of these imitators. To him the novel was rather a picture of present-day life, presented in all its details, whether romantic or sordid. Such wonderful vogue did his novels have that they became a real influence, and Dickens made use of this influence by introducing into almost every novel a crusade against some evil in society. Other authors followed his example, though some of them, as Thackeray, directed their efforts not so much against institutions, as against the

produced few novelists of world-wide reputation, and Nathaniel Hawthorne stood almost alone in the nineteenth century as a writer of American fiction in the form of the novel. Henry James, though born an American, lived in Europe.

In the twentieth century, the novel has been the subject of much experiment, and its form has sometimes been stretched almost to breaking-point. In English fiction H. G. Wells, by his determination to use the novel for the discussion of those ideas which are



RESTORATION OF MUTUAL CONFIDENCE BETWEEN MR. AND MRS. MICAWBER

Courtesy, Chapman and Hall.

shams and hypocrisies of society at large. The only novelist in this period worthy to rank with Dickens and Thackeray is George Eliot, whose stories, even if not so popular as those of her two great contemporaries, have a rare power of character analysis.

The list of those English writers who, in the nineteenth and twentieth centuries, contributed to the output of novels, is long. Some of them, such as Charlotte and Emily Brontë, Trollope, Meredith, Hardy, and Stevenson, were real masters of this form of writing.

In the eighteenth and nineteenth centuries France produced many famous novelists, such as Marivaux, Rousseau, Mme de Staël, Dumas, George Sand, Balzac, Flaubert and Zola. In Russia, there are the great names of Gogol, Turgenieff, Dostoevsky, and Tolstoi. Until recent years America has

uppermost in his mind at the moment, has made it the vehicle of social, political, and religious criticism. Experiments of a very different sort are being carried on by such writers as James Joyce and Virginia Woolf in England, and by William Faulkner and John dos Passos in America. With those authors the novel is becoming less and less a narrative of external events, and much more a re-creation of the thoughts and feelings, and even the subconscious life, of the characters involved. Realism, started in France by Zola, and carried over to England by George Moore, has almost ceased to startle the modern novel reader. In the midst of much experiment, the traditional type of novel continues to find many readers, who are able to satisfy their desires in the work of writers like Bennett, Galsworthy, and Hugh Walpole. A notable feature of the

last decade has been the popularity of detective fiction. The "saga" in contemporary fiction, in which a number of successive novels deal with the fortunes of some particular family through several generations, owes much of its present popularity to the novels of John Galsworthy. In surveying the field of modern prose fiction, it is well to bear in mind that there is no one public for the novel: there are many publics, at different levels of culture, and with different desires to satisfy, and it is only the very exceptional novelist who can reach the now vast reading public at every level of culture.

NOVEMBER. The Anglo-Saxons called November the "wind month" or the "blood month," the latter name probably having reference to the killing of animals for the winter supply of meats. November was one of the months to which the Romans never gave a specific name. "The ninth month" it was called, for that was originally its place in the year, and from the Latin *novem*, meaning "nine," has come the present name. Later, when January became the first month, November became what it is to-day, the eleventh. At one time a change of name was suggested. July had been renamed after Julius Caesar, August after Augustus Caesar, and a subservient Senate offered to call the eleventh month after Tiberius Caesar, but he declined.

NOVOCAINE, also called **PROCAINE**. A drug derived from cocaine, used to produce local anaesthesia.

In making novocaine, chemists analysed the molecule of cocaine into its forty-three atoms and found out which groups were effective in producing local anaesthesia. They then built up a new compound which retained the pain-destroying principle of cocaine without its poisonous properties.

NOVOSIBIRSK. See **SIBERIA**.

NOYES, ALFRED b 1880. English poet. Noyes was born in Staffordshire and was educated at Oxford. He quickly gained recognition as a writer and contributed numerous articles to the weekly and monthly journals and reviews in England and America. At the same time his output of verse was considerable. It was extremely popular, being attractive and melodious in the familiar Victorian traditions. In particular it has much of the lyricism and rhythmic ease of Tennyson. *The Torch-bearers* is an epic poem, conceived on an ambitious scale, being an attempt to describe and interpret the great episodes in the history of scientific discovery. Among his other poetical works are *The Loom of Years* (1902), *The Flower of Old Japan* (1903), *Tales of the Mermaid Tavern* (1913), *The Elfyn Artists* (1920), *Ballads and Poems*

(1927). Noyes wrote a biography of William Morris in the *English Men of Letters* series, and has produced also numerous short stories, novels, plays and essays. From 1914 to 1923 he occupied the Chair of Modern English Literature at Princeton University, U.S.A.

NUBIA. The name for that part of the Nile Valley known in ancient times as Kush, and now incorporated in the main in the Anglo-Egyptian Sudan. It stretches from Egypt to Ethiopia and from the desert to the Red Sea. The term is now little used except in relation to the Nubian desert that extends from the Nile to the Red Sea in that part of the Sudan. There is little cultivation, even along the Nile, the greater part of Nubia being a desert region. A few small oases determine the course of caravan routes, but there is little pasturage on the whole, except for camels. The inhabitants are mainly of Arab stock, mixed with Nilotic negroes. The Arabs entered the region in the seventh century.

NUCLEUS. In an atom, a nucleus is a particle charged with positive electricity, around which electrons circulate. Until the latter part of the nineteenth century it was generally believed that every chemical atom was an unbreakable particle, all the atoms of the same element being exactly like each other. Each chemical element was supposed to be composed of its own particular kind of atoms. Recent discoveries question this, and the atom itself is now believed to be a more or less complex structure. Every atom is now supposed to consist of two kinds of matter in varying quantity and arrangement. These two components are called "electrons" and "protons" respectively. The electron is supposed to be the unit of electricity, a single electron having a mass which is little more than one two thousandth part of the mass of a hydrogen (the lightest) atom. Practically the whole mass of the atom is associated with the protons, which may be regarded as the units of positive electricity. The atom is supposed to consist of a positively charged particle called the nucleus, around which a number of electrons circulate in orbits, much as planets circulate around the sun. When the atom is in its normal state, the negative electric charge on these rotating electrons just neutralizes the positive electric charge on the nucleus. The nucleus is the heavy part of the atom, practically all the atomic mass being here. It is very much smaller than the atom itself, just as the sun is very much smaller than the solar system. In fact, an atom has just such an open structure as the solar system, the spaces between the planets and the sun being much larger than the actual planets and the

sun itself. Similarly, the spaces between the electrons and the nucleus are large compared with the actual dimensions of these component parts.

The nucleus consists of one or more protons, together with a number of electrons, since not all the latter are circulating in orbital motion. These nuclear electrons, whilst existing in the nucleus itself, do not add appreciably to its mass, since two thousand of them would be required to make up a mass equal to that of a single proton.

The nuclei of different chemical elements thus consist of protons and electrons in various numbers, each element having its own grouping.

NUDISM. A cult that is revived periodically. Frequently it has been associated with religious or social rites. In ancient Morocco, when rain was needed, naked women used to retire to places where they could not be seen by men, and play games with a ball; in southern India, naked men tried to induce rain by beating drums; and in ancient Rome nakedness was considered to be a cure for some forms of disease. To be naked and unashamed was declared to be one of the glories of the cultivated Greek. The Greeks were proud to "strip their bodies to the sun." Athletes at the early Olympic games probably appeared naked. Girls of Sparta used to take their gymnastic exercises in a state of nudity, but this was not a general practice among Grecian women. Ruskin, however, declares that the mere admiration of physical beauty, and the arts which sought its expression, not only conduced greatly to the fall of Greece, but were the cause of errors and crimes in her greatest days. In modern times, in Western Europe, nudist colonies have been formed in the belief that exposure of the human body to the sun's rays and to the air is beneficial to health.

NUFFIELD, WILLIAM RICHARD MORRIS, FIRST BARON (born 1872). He was born at Cowley, near Oxford, and in 1894 became an assistant in a small bicycle repair shop. Nine months later he began making bicycles and winning racing championships on his own products. In 1910 he turned to motor-bicycles and two years later he began to make light cars, well-engined and dependable. After the World War his company became the largest single motor manufacturing company in Britain. He is a generous benefactor of many institutions and to Oxford University alone has given £2,000,000 to medical research.

NUISANCE. In law, this is the use of one's premises or other property, or the carrying on of a business, in such a way as to cause material annoyance, inconvenience, or discomfort to one's neighbours or to the

public in general. The most common types of nuisance are smells, noises, vibrations and obstructions. The annoyance must be such as would cause real discomfort to an ordinary, reasonable person. What would be a nuisance in one environment is permissible in another. For example, a slaughter-house in a residential section of a city would be a nuisance, because its foul odours would render adjoining houses uninhabitable; but it would be unobjectionable in a factory area, where its neighbours might be a tallow factory on one side and a brewery on the other. The test is: is this use of these premises (or the carrying on of this business) *reasonable* in all the circumstances? Where a nuisance is such that it annoys a substantial part of the community, it is a *public* nuisance, and the proper person to take proceedings to stop it is the Attorney-General, but a private individual may sue if he is affected by it more than other members of the public. A nuisance which affects only a few people is a *private* nuisance, and the persons affected are the proper ones to sue. There are two legal remedies for a private nuisance, either damages or an injunction (which see). The latter is, of course, the more effective. A public nuisance, besides giving grounds for civil proceedings, is also a criminal offence and punishable as such.

NULLITY (from Latin *nullus*, none). A term employed in law for a transaction which is totally void and of no legal effect. Thus a will is null and void if not signed and witnessed according to the Wills Act, a transfer of shares in a company under the Companies Clauses Act is void unless made by deed, and so on. These are cases of nullity arising because the *form* required by law has not been complied with, but in some cases a contract may be void, although correct in form, on the ground that its object is illegal or immoral or against public policy (thus wagers have been made void by statute), or that one of the parties had not legal capacity to contract, or that there was a mistake on some fundamental point. But where the parties have embodied their contract in a deed or writing, the law will seldom allow one to escape liability by pleading that the writing does not express his real intention; however, when a man has been induced by fraud to sign a document of a totally different nature from that which he intended to sign, he will not be bound thereby.

Contracts which are absolutely null and void must be distinguished from those which are merely *voidable*, e.g. contracts induced by fraud. The latter are binding contracts as from the time they were made, but one party (in our example, the victim of the

fraud) has a right to put an end to the contract and free himself, provided it is not too late for both parties to be restored to the position they were in before the contract was made; if, however, it is too late for this, and especially if third parties have in the meantime acquired property or rights under the contract, the contract can no longer be rescinded, although the victim can claim money damages for the fraud of the other party.

For decree of nullity in marriage law, see **DIVORCE**.

NUMA POMPILIUS. In Roman legendary history, the second king of Rome, whose wife was said to have been the nymph Egeria. He was the successor of Romulus, the legendary founder of Rome. He came to the throne in 715 B.C., and reigned until 672 B.C. The Romans of a later day attributed to him the building of the temple of Janus (the doors of which were shut during his reign to show that peace prevailed), the founding of the order of the Vestal Virgins, and the appointment of the first priests and augurs. In reality, however, those institutions were the slow growth of centuries.

NUMBER. See **NOTATION**.

NUMBER. In grammar, the distinction, in a noun, pronoun or verb, between one and more than one, usually made by means of a change of form or inflection. The great majority of nouns and pronouns are inflected to express number—that is, changed in form; in the case of verbs, which must agree with the number of their subjects, such inflection is, in ordinary language, limited to the present tense, third person singular; as, he *skates*, they *skate*. See **INFLECTION**.

NUMBERS. The fourth book of the Pentateuch, continuing the narrative of *Exodus* and *Leviticus*. It covers thirty-eight years in time, and follows the Israelites in their journey from Mount Sinai to the plains of Moab. Like other books of this period, it comprises stories, records, and laws from many sources. See **PENTATEUCH**.

NUMERALS. See **NOTATION**.

NUMEROLOGY. A pseudo-science based on the theory that the name and birth-date of an individual indicate his personal characteristics, abilities and life. Numerology is said to have been used by the ancient Chinese and Jews; Pythagoras (6th century B.C.), the Greek philosopher, applied it.

The law of vibrations is fundamental to numerology; namely, that the rate of vibration of an individual depends upon the numerical value of his name. The vibratory rate of the name should be in harmony with that of the birthdate; if it is not, the first name should be changed until it is.

How to Determine Your Number. Each letter in the alphabet has a number assigned to it; nine is the highest number used, and when the numbers of a name are added, and a figure greater than nine results, it is reduced by adding its digits: thus, 49 would be $4 + 9 = 13$ and $1 + 3 = 4$. Each letter has the numerical value of the number at the head of its column, thus, A, J, and S all equal 1, etc.

1	2	3	4	5	6	7	8
A	B	C	D	E	F	G	H
J	K	L	M	N	O	P	Q
S	T	U	V	W	X	Y	Z

The number arrived at by adding the numerical values of the vowels of a name reveals the *ideality* of an individual, or his natural talents; the consonants represent the *personality*, or impression; and the full name, the destiny, or future. The original name, not a nickname or marital name, is used. Nicknames are said to reveal the impression one has made on one's friends.

The birth-date shows the path of life, and is determined by giving the month its numerical value, and reducing to one digit. Thus, 11th August, 1930, would be—

$$8 + 2 + 4 = 14 \rightarrow 5$$

August 11 1930

The meanings are as follows—

1. Creative powers, individualization, initiative, daring, and independence, with the adverse quality of dominance.
2. Constructive and collective powers, diplomacy, tact, and the adverse attribute of indifference.
3. Expression, ambition in art, etc., but having the negative quality of intolerance.
4. Steadfastness, good intellect, fond of work or study, but liable to discontent.
5. Rich in experiences, versatile, active, charming, but self-indulgent.
6. Reliable, loving, good teachers and mothers, but over endowed with anxiety.
7. Spiritual, desiring perfection, wisdom, authority, but overwrought with a turbulence of mind.
8. Financial success when energies are properly and justly directed, but liable to be unjust.
9. Success in art, literature, and healing, with love as their watchword and desire their downfall.

NUMIDIA, *nū mid' iā*. The Roman name for a district in North Africa which corresponds to some extent to the modern French possession of Algeria. After its annexation by Rome in 46 B.C., Numidia became a flourishing state. It was afterward conquered by the Vandals, who were in turn driven out by Arabs. The latter were finally conquered by the French.

NUMISMATICS, *nū mis mat' iks*. The science which treats of coins and medals, with reference to their description, beauty, value, classification, and history.

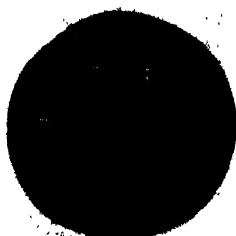
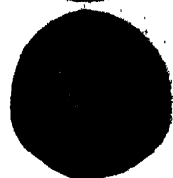
Every coin has five parts. The side bearing the head, bust, figure, or emblem of the country, or the person or event in honour of which the coin was made, is called the *face*, or *obverse*. The opposite side, with its designs or

In the seventh century B.C., the Greeks issued coins, the oldest known, while Petrarch (1304-1374) was the earliest collector of note.

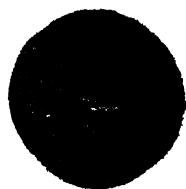
There is no set method for arranging coin collections; sometimes they are laid out according to their geographical relations; sometimes in accordance with their age; while in other cases, they are arranged in series of



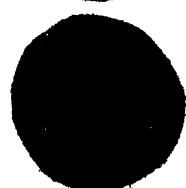
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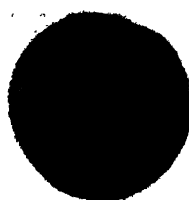
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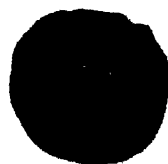
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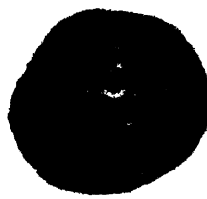
ATHENS



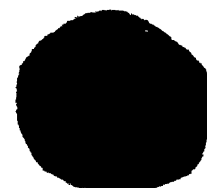
TARENTUM



CAMPANIA



MACEDONIA



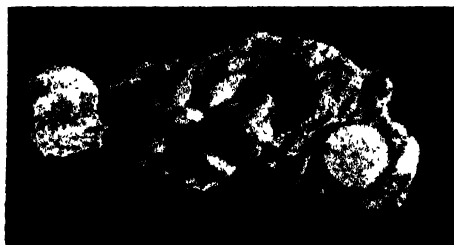
ANCIENT

words, is the *reverse*. Letters stamped round the border are the *legend*, while those in the middle, or field, are the *inscription*. On some coins, a line divides the inscription from the *basis*, which contains the date, signature of the designer, and in some cases the mint mark. *Struck* coins are made by exerting enough pressure on the die to transfer the design, while others are produced by pouring molten metal into moulds. The latter are said to be *cast*. Gold, silver, bronze, nickel, and copper are most commonly used for making coins, and the round shape has been generally adopted.

denominations or metals. However they are kept, besides having a real money value according to their rarity, they shed interesting light upon the art, mythology, history, religion, geography, and literature of the times which they represent.

NUMMULITE, *num' ū lite*. A kind of fossil (Latin *nummus*, money). Nummulites are coin-shaped, and each one consists of a series of small chambers arranged in a spiral and communicating by small openings through the partitions. They are the shells of one-celled animals (*Protozoa*) belonging to the class *Foraminifera*. In several parts of

the world, limestone formations of Tertiary age, some of them hundreds of feet thick, are made up largely of such shells. The great



NUMMULITES

Photo. H. E. Taylor

pyramids of Egypt are partly built of such rock. See GEOLOGY.

NUN. In the Roman Catholic Church, the name given to a woman who renounces the world, enters a religious community, and devotes her life to religious service. There are many orders of nuns, with various missions in life. Some care for the sick and wounded, others protect the aged and the friendless, while still others engage in educational work; but the vows in all these orders are very similar. The first convent for women was founded about A.D. 320 by the sister of Saint Pachomius, in the Egyptian desert; the first one in England was founded by Eadbald, king of Kent, at Folkestone in 630. See MONASTICISM.

Derivation. The word *nun* is supposed to have originated in a Coptic (Christian Egyptian) term meaning "pure."

NUNCIO, nun' shio. See LEGATE.

NUNEATON. An important industrial town near the north-eastern border of Warwickshire, 96 miles from London. Population 46,305 in 1931. The town is served by the L.M.S.R. and has four stations on routes linking up with Coventry, Birmingham, Tamworth, Burton-on-Trent, Leicester and Rugby.

Industrially, Nuneaton has a large variety of more or less independent trades and industries. There are a number of collieries producing fine steam coal. The textile industries are important, and include weaving, worsted spinning, and the manufacture of clothing. Boots and shoes, motor-car bodies, hats, sports requisites, machinery, bricks and tiles, artificial silk, and boxes are also made.

In the Domesday Book the town is mentioned as Etone (water town), the prefix "Nun" having been added when a Benedictine nunnery was founded there in King Stephen's reign. Between the year 1539, when Henry VIII suppressed the monas-

teries, and 1882, the town was of no consequence. Various industries were attracted to the town about the latter year, and it began to grow in population and importance. It is now one of the most progressive towns in the Midlands, and a Municipal Borough.

The Parish Church of St. Nicholas dates from the fourteenth century.

NUREMBERG. See GERMANY.

NURSEHOUND. This fish is the largest, if not the commonest, of the several species of Dogfish (which see) found in British and European coastal waters. It is, like all its relatives, extremely voracious and capable of doing a great deal of damage among fish hooked on fishermen's lines. Nursehounds,



NURSEHOUND

Photo. Weller

are very powerful fish and give good sport when hooked. They sometimes reach a length of 5 ft. or more.

Scientific Name. *Scyllium catulus*

NURSERY. That portion of a garden in which young plants, trees, flowers or vegetables are grown, in the open or under glass. The term has also been applied to the gardens of plant salesmen. Some commercial nurseries have distinctive features, specializing in roses or fruit-trees, ornamental trees, etc. Generally speaking, the best site for a nursery is on sloping, wind-protected ground, not overshadowed by trees. The soil should be light and sandy. Hot-house nurseries for the growing of tomatoes, cucumbers, grapes, etc., have recently become popular in the southern counties of England, and have enabled growers to increase considerably their output.

NURSERY SCHOOLS. See KINDERGARTEN.

NURSES AND NURSING. The profession of sick nursing, as understood at the present day, may be said to have originated from the work of Florence Nightingale in the Crimean War of 1853-56. Before that time, nursing was carried on mainly by members of religious bodies, whose will was often of a higher order than their skill.

In Great Britain the organization of the nursing profession is controlled by the general nursing councils, one for England and Wales, and one for Scotland, set up under the Nurses Registration Act of 1919.



NURSING

1. V.A.D. training camp at Osborne. 2. Demonstration by a doctor of the preparation of an anaesthetic. 3. Anatomy lecture. 4. A children's ward.

Photos: Central; Fox; Topical

There is a register of nurses with general training, and five supplementary registers for the special branches of Mental, Mental Defective, Fever, Sick Children's Nurses, and Male Nurses.

Probationers are accepted in recognized training schools, which must be hospitals having at least one hundred beds, usually not before the age of 20, and they become registered after at least three years of training and passing the required examination. Many of them then continue as hospital nurses for the whole of their careers, and the highest position to which a nurse can attain is that of matron to a large general hospital. Others take up one or another of the numerous branches of the profession that are now open to them. Among these are the following—

Sister Tutors are nurses whose duties lie mainly in teaching; they lecture to nurses in training.

District Nursing. After her general training a nurse can take up district training and be enrolled as a Queen's Nurse. She then follows her profession in a town or country district.

Public Health is a branch wherein nurses work under county or borough schemes

from which they are sent to private patients in their own homes, or they work in a private nursing home.

Midwives' work is controlled by the Central Midwives Board. They obtain their certificates after a six months special course for a trained nurse, or twelve months for one who has not had general training.

Mental Nurses undergo a three-year course in a recognized mental hospital before they can take the state examination for mental nurses. They may be of either sex.

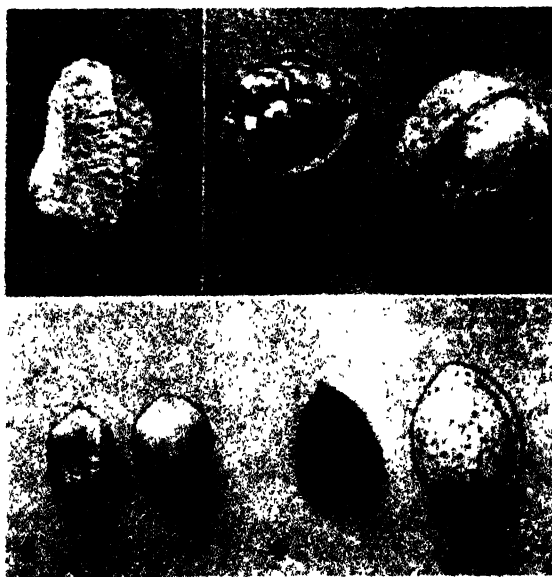
The **Imperial Military Nursing Service**, founded under the patronage of Queen Alexandra in 1902, is another branch of nursing, as also are **Princess Mary's Royal Air Force Nursing Service**, **Queen Alexandra's Royal Naval Nursing Service**, **Prison Nursing**, and the **Overseas Nursing Association**, which provides nurses for the Crown Colonies and other British communities abroad.

NUT. A fruit enclosed in a shell of wood, fibre. The wide variety of nut-producing trees, and their general distribution throughout the temperate and tropic zones, have caused nuts to become an important article of commerce. They are highly valued as food and as a source of vegetable oil.

The meat of nuts is particularly rich in substances which produce energy. Fat constitutes the chief ingredient, and the percentage of protein is usually high (see PROTEINS). Some nuts contain proportionately nearly fifty times as much fat as wheat flour, and the average fuel value of a large number is over 3000 calories per pound (see CALORIE). In some parts of Europe, nuts form a considerable part of the regular diet, bread being made from the ground kernels of chestnuts.

Nut-bearing trees cannot be successfully produced as fruiting trees from seed, because they are wind-pollinated, and hence subject to crossing of varieties. Seedling trees are grown to be used as stocks upon which to graft the kinds which are known to have the desired qualities.

NUTATION, *nū lay' sh'n*. Subordinate motion of the earth's axis, caused by the varying attraction of sun and moon on the equatorial ring of the earth. The sun and the moon each exert an attraction, unequal in force, on this ring. The result is to give to the plane of the earth's equator, and thus to the celestial equator, a motion relative to the ecliptic, resulting in an unusual west-



NUTS

1. Brazil. 2. Walnut. 3. Hazel. 4. Almond.

controlled by the health authorities; this includes infant welfare, school children, and isolation hospital work.

Private Nursing. Nurses who take up this work usually belong to some institution

ward motion of the equinox. Because of the varying positions of the sun and moon, the forces in action vary, causing the motion of this equinox to vary. The motion is analysed into two parts—a constant part called the *precession*, and variable parts called *nutations*. One of the effects of precession is to cause the celestial pole to swing round a small circle of the celestial sphere in about 25,800 years, but the effect of the variations in the precession is to cause the actual path of the pole to be a slightly wavy one, and it is from these oscillations, or noddings, that the nutation gets its name (Latin *nutare*, to nod).

NUTCRACKER. A bird of the crow family found in the mountainous regions of Europe and Asia, and so called because of its supposed ability to crack nuts with its bill. It is a small bird with a comparatively long tail; its plumage is a mixture of light brown, white, and black. The nutcracker feeds chiefly on the seeds of pine cones, and has the rather interesting habit of holding these in its claws while pecking at them. The three to five speckled, greyish-green eggs of this bird are laid in a nest hidden in the top of a tall pine tree.

Scientific Names. The nutcrackers belong to the family *Corvidae*. The Old-World species described above is *Nucifraga caryocatactes*.

NUTHATCH. The name of a group of climbing birds, common throughout the



NUTHATCH BY NEST HOLE
Photo: John Kearton

temperate regions of Europe and North America. Nuthatches receive their name from their habit of wedging nuts into crevices in the bark of trees and then "hatching" them with repeated strokes of the bill. They devour insects and their larvae, wild nuts, especially beechnuts, and waste grain and weed seed. The eggs are from five to ten in number, and are white or creamy in colour, speckled with reddish-brown or lavender.

Scientific Name. Nuthatches belong to the family *Sittidae*.

NUTMEG. The kernel of a tropical fruit, which is extensively used as a spice. The

wild tree attains a height of 60 ft. and is an evergreen. Although the trees originally grew in the Spice Islands, they have been successfully cultivated in all of the East Indies, the West Indies, Brazil, Ceylon and India. Their long, pointed leaves have well-marked veins, and the pale-yellow flowers hang in drooping clusters, much resembling lilies of the valley. As the fruit ripens, the fleshy part becomes rather hard, somewhat like candied fruit, and finally splits open at the top, disclosing a bright-scarlet membrane, which partly covers the nut. From this membrane is obtained the spice known



to cooks as *mace*, while the kernels inside the nuts, the familiar household nutmegs, after being dried in an oven, are packed and shipped as spice to all parts of the world.

Although the trees do not begin bearing until they are about nine years old, they have heavy crops after they start, for each tree produces from 1500 to 2000 nuts yearly. In countries where the tree is grown, the fleshy part of the fruit is often preserved and

caten as a sweetmeat, while a transparent oil, called *oil of mace*, is obtained from the kernel. Singapore is the main centre of export.

Scientific Names. The nutmeg tree belongs to the family *Myristicaceae*. Its botanical name is *Myristica fragrans*.

NUTRITION. The process by which the human body absorbs into its system food, water and oxygen, thus promoting its growth, providing itself with energy, and repairing its worn tissues.

The body may be likened to an engine in that it takes in fuel (food) and air and translates these into heat and energy. But there the resemblance ceases, for the body absorbs its food and water together, selecting therefrom particular substances and converting them for the differing purposes of (1) warmth, (2) enlargement (growth), and (3) replacement of worn parts. Such replacement takes place without noticeable interference with or the cessation of the individual's normal activities. This continuous chemical change, by which nutritive material is built up into living tissue, or consumed to provide heat and energy, is termed *metabolism*.

At its birth, the infant becomes a self-contained unit and soon commences to take in varied substances in the form of its mother's milk, which, for the first few months, suffices for its body-building and replacement requirements. As the child acquires powers of active movement, it needs a more varied and increasing supply of materials, for now it is building within itself bones, muscles, tendons, teeth, hair, and at the same time, utilizing the tissue of its muscles in providing itself with energy. See **PHYSICAL EDUCATION**.

On reaching maturity, growth ceases, but the increased energy required to move its larger bulk against gravity, and the never-ceasing process of repair and replacement, maintain a demand for an undiminished quantity of food, although with altered proportions of building and energy-producing elements. Thus, taste and diet tend to change after childhood.

Food and drink in excess have harmful results. Dealing with unneeded quantities of foodstuffs taxes energy, needed for other purposes, and reduces efficiency. Insufficient food or that of the wrong kind will also lead to inefficiency or ill-health. The selection of substances in quantities and proportions best suited to the circumstances of differing classes of individuals is a problem the importance of which has been realized, particularly of recent years. To resolve this problem it is necessary to know what energy the body expends in performing its tasks, and what is the energy content of the various kinds

of foodstuffs available from which the loss is to be made good.

For this purpose an instrument is used known as the *calorimeter* (heat measurer). It consists of a chamber or enclosed space, well built and insulated as to prevent the escape of heat generated within it. The chamber has an air inlet and outlet and a coil resembling a steam radiator, through which water circulates. All heat given off within the instrument can be accurately measured. By this means, the heat output of persons engaged in various activities within the calorimeter is ascertained and data as to their energy requirements obtained.

The term "calorie" has been adopted as the unit in heat measurement, and signifies the amount of heat required to raise a kilogram (a little over a quart) of water from 0°C to 1°C. A man engaged in moderate muscular work gives off about 3000 calories daily. An average woman, equally active loses about four-fifths of this quantity. Owing to the demands of growth, an active boy of fourteen will need replenishment equivalent to that of a man leading a sedentary life. Mental activity of itself causes no loss of heat. The energy requirements of adults vary according to their weight and their occupations. The following figures were published in 1914 by a joint committee of the Ministry of Health and British Medical Association.

Class of Individual	Average Daily Requirement in Calories
Man: Heavy work	3400-4000
Light work	2600-3000
Woman: Active work	2500-3000
Light housework	2600-2800
Boy: 14-18 years	3000-3400
Girl: 14-18 years	2800-3000
Child: 12-14 years	2800-3000
8-10 years	2000-2300
3-6 years	1400-1700
1-2 years	900-1100

There are three classes of ingredients essential to human foodstuffs—proteins, fats, and carbohydrates. Certain metallic elements (iron, for instance) are also needed and are to be found mainly in fruits and vegetables. Most foodstuffs contain water (lettuce is nine-tenths water), but this essential is taken for the most part in liquid form. The heat energy produced by the combustion of the three main types of food-materials in the body is approximately—

	Calories
Protein, 1 gramme	4.1
Carbohydrate, 1 gramme	4.1
Fat, 1 gramme	9.3

Proteins. These are contained in milk, cheese, eggs, meats, beans, nuts, bread, biscuits, etc. This class supplies the element

of nitrogen—an essential ingredient of "repair" material and indispensable to life. The precise extent to which proteins contribute to the repair and building of the body is still a matter of investigation, but sufficient data have been obtained to show that unless milk, eggs, meat and nuts enter into diet there will be insufficient nitrogen-containing substances to satisfy the needs of growth and replacement of waste tissue.

Fats. Butter, cheese, fresh meat, milk and bacon have a high proportion of fats, whose value lies in their complete oxidation in the body, with a resultant high output of heat and energy.

Carbohydrates. These are contained in fresh vegetables, fruits, sugar, jams, bread, biscuits, milk. The carbohydrates are very complex substances and are broken up by the body into simpler substances, some of which are utilized wholly in the production of heat whilst others contribute to replacement and growth.

Proteins burned completely in a calorimeter give a certain heat output, but experiment has shown that proteins do not undergo complete oxidation in the body. Whereas free nitrogen is given off in the calorimeter, this element is expelled (with other substances) from the body as urea, a constituent of urine. In calculating the value to the body of proteins, their calorimeter heat value must be reduced by the estimated heat content of the unused or waste products. Fats have about twice the heat value of carbohydrates and proteins.

A diet suited to an active man, who needs between 3000 and 4000 calories daily, should comprise carbohydrates, proteins and fats in the proportions by weight of 75, 17 and 8 per cent respectively.

A weekly ration suggested by the British Medical Association Committee as being the minimum essential for the maintenance of health and working capacity of a man is given in the table following.

Flavour v. Taste. Theoretically, the requisite number of calories needed by a particular individual could be obtained from any one of the three classes of food substances. The needs, in calories, of a man at moderate muscular work are contained in 2½ lb. of bread, or 14 oz. of butter, or 9½ lb. of milk, or 10½ lb. of apples, or 35 lb. of lettuce. A diet limited to any one of these items would not suit the taste nor the digestive system. To prevent delayed expulsion of waste material from the body, the food should move through the digestive tract at a certain rate. This is greatly assisted by the presence in the food of fibrous material found in vegetables and fruits, whose acids probably also contribute to correct lubrication and

Item	Quantity	Calories
Beef	1 lb.	1126
Minced meat	½ lb.	563
Bacon	½ lb.	1239
Corned beef	½ lb.	639
Ox liver	½ lb.	147
Eggs	2 oz.	82
Cheese	½ lb.	1005
Milk	1½ pt.	661
Fish, cod	½ lb.	69
Butter	½ lb.	867
Suet	1 oz.	247
Lard	½ lb.	1055
Flour (or)	4½ lb.	7470
Bread	7½ lb.	7518
Sugar	1 lb.	1860
Jam	½ lb.	972
Potatoes	5 lb.	1865
Dried peas	½ lb.	367
Tea	½ lb.	—
Oatmeal	½ lb.	943
Salt	½ oz.	—
Rice	½ lb.	405
Syrup, treacle	½ lb.	714
Cabbage	1 lb.	85
Butter beans	½ lb.	385
Bark y.	½ lb.	825
Fresh fruit and vegetable	—	100
Total weekly calories	—	23,761

functioning. No diet, therefore, should lack a proportion of vegetables and fruits.

The taste of food depends not only on flavour but also on consistency. A pound of cream has high food value, but eaten by itself would be nauseating. To provoke the flow of gastric fluids essential to satisfactory digestion a diet must be pleasing. This effect is found to be produced if sugar and fat in some form are present in the diet. Probably the explanation lies in the fact that fat has so high a fuel value, and that sugar is far more quickly absorbed than other nutrients and requires less energy for its digestion. Sugar thus becomes especially desirable in times of great muscular strain.

Vitamins. An interesting and important advance in the science of nutrition was the discovery in certain natural foodstuffs of minute quantities of substances to which the name "vitamins" was given. It seems that these substances assist the body to make the best use of foods of which they form part. Under normal conditions the fresh vegetable and animal foods consumed provide an adequate supply of vitamins, but when tinned foods are wholly relied upon, "deficiency diseases" (scurvy, rickets) occur.

NUX VOMICA, *nuks vom' ik a*. A powerful drug containing two alkaloids, strychnine and brucine. Nux vomica is obtained from the dried ripe seed of a tree found in India and Cochin-China. The drug is poisonous to animals, and also to man in anything but very minute quantities. In

small doses, it is frequently given as a stimulant in stomach and nervous disorders; in large quantities, it causes convulsions and even death. The effects of the drug are similar to those of strychnine (which see).

The tree from which the drug is obtained is known botanically as *Strychnos nuxvomica*.

NYASA, OR NYASSA, *nyah' sa*. A freshwater lake in tropical Africa, near the eastern coast. It is over 350 miles long and about 40 miles wide. The lake covers an area of 14,200 sq. miles. The western side is very shallow, but the average depth is over 2000 ft. The lake is 1045 ft. above sea level, and is surrounded by mountains, some of which reach a height of 10,000 ft.

Nyasa was first explored in 1859 by Dr. Livingstone and Albrecht Roscher, a German traveller, the former approaching it from the south, and the latter from the east. It had been known to the Portuguese as *Moravia* since the seventeenth century.

NYASALAND. A British Protectorate lying around the west and south of Lake Nyasa in tropical Africa. It has a land area of 37,596 square miles and a water area of some 10,000 square miles, which includes Lake Chilwa and the whole of Lake Nyasa except the eastern half of the northern end. The whole area is part of the African plateau, but it lies at different levels. Lake Nyasa and the Shiré valley to the south are part of the great Rift Valley. To the west lie the Nyasa highlands, where the average elevation is over 1000 ft. and several heights rise to over 4000 ft. To the east of the Shiré valley are the Shiré highlands and Mlanje Mountains, rising in part to well over 3000 ft.

The Shiré is the only river of importance, but rapids obstruct its course, and its exit from Lake Nyasa is useless for navigation. Port Herald, in the south of Nyasaland, can be reached by steamer from the Zambezi in the wet season.

Elevation modifies the high tropical temperatures, and in winter night frosts are common. Rainfall is not heavy, and most falls between November and March. Open grassland covers most of the country, but there are forests in the valleys and on the wetter mountain slopes.

The population numbers about 1,604,000 of whom 1817 are Europeans, mostly in the Shiré highlands, and 1474 Asiatics. The natives are Bantu negroes; Nyanja is the prevalent tongue. Mohammedanism is widespread, but Christianity has many converts.

Products and Trade. The natives cultivate for their own use maize, millet, cassava, sweet potatoes and other tropical crops, and rear cattle, as far as the ravages of the tsetse fly allow. Cotton and tobacco are grown both by white settlers and by natives. Tea promises well, but coffee cultivation has decreased in recent years. Tobacco export reached 10,000,000 lb. in 1933, cotton 2,400,000 lb., and tea about 2,000,000 lb. Export is mainly to Great Britain, but transport costs are high before a port of shipment is reached. There is a railway from Blantyre to Chindio on the Zambezi in Portuguese East Africa, and a great bridge was completed in 1935 connecting this with the line from the Murrumbidgee on the southern bank, to the port of Beira. Northward from Blantyre the line is being extended to Lake



TEA TERRACING, CHOLO, NYASALAND
Photo: H.M. East African Dependencies

Nyasa. Zomba, in the Shiré highlands, at an altitude of 3000 ft., is the administrative centre. It contains 180 whites. Hydro-electric power is used to light the town.

explorations which made the country known. In 1874 the Livingstone mission was founded at Blantyre. Out of this grew the African Lakes Corporation which brought British influence into the area, checked Arab slave raiding, and curbed Portuguese and German aspirations from south and east respectively. In 1891 the British Protectorate was declared which was called British Central Africa until 1907, when the name was changed to Nyasaland. It is a Crown Colony under a Governor and Commander-in-Chief who is assisted by nominated executive and Legislative Councils. There are a number of missions and private schools supported by government.

NYMPH. An immature insect, either pupa or chrysalis.

NYMPHS. In mythology, maidens possessed of eternal youth, who guarded the different realms of nature. *Oreads* watched over the hills and mountains, *Nereids* inhabited the sea, *Oceanids*, the ocean, *Dryads* and *Hama-dryads*, the trees, and *Naiads*, the rivers, brooks, and springs. Although all were of divine birth, only the *Oreads* and *Naiads* were immortal.

NYSTAGMUS, *nis tag' mus*. MINES'. See COAL (Mine Lighting).



NYMPH

(Courtesy, Victoria and Albert Museum)

Blantyre (674 whites and 15,000 natives), at an elevation of 3500 ft., is an older settlement and was originally a missionary centre.

History and Government. The Portuguese traversed this country in the seventeenth century and Bocarro in 1610 saw Lake Nyasa, but it was Livingstone's visit in 1859 and

THE WORLD BOOK

Oo

O. The fifteenth letter in the English alphabet, and the fourth of the vowels. The Phoenician alphabet had a letter which in form was like the capital *O*, and was called *ayin*, meaning "eye"; but, like all the Phoenician letters, it was a conso-

nant. The Greeks used the letter form to represent the sound of *o* in *no*; perhaps this use was suggested to them by the rounding of the lips in making that sound. At first the Greeks had only one *o*, but later they developed another, calling the first *omicron*, or little *o*, and the other *omega*, or great *o*. The former stood for the short sound of *o*.

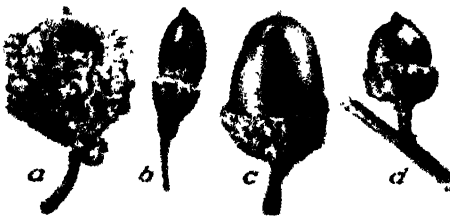
In English, *o* is made to do duty for a number of sounds. The most important are the long *o* sound, as in *note*, which resembles the sound of *o* in continental European languages; and the so-called short *o* sound, as in *not* and *log*. Other values are the *oo* sound, as in *prote*, and the *u* sound, as in *love*.

OAK. A deciduous tree of the beech family, common in most temperate parts of the world. The acorn is the oak seed; it is like a round, smooth-shelled nut, pointed at its outer end and enclosed at the inner end by a saucer or cup. Most oaks can be recognized by their leaves, but the *holm oak*, or *ilex*, and some other varieties have a smooth-edged leaf. Oaks grow slowly, and flourish

which is still apparently as sound as when cut nearly 900 years ago. Apart from the rare woods like mahogany, rosewood and ebony, oak is equalled in weight only by hickory. It rots very slowly, even if subjected to alternate dampness and drying. For shipbuilding, it was the principal material before the day of steel. It has considerable beauty, especially when quarter-sawn.

Two or three centuries is the usual life of an oak, but in England there are some trees still thriving which are thought to be more than five hundred years old. By tradition the oak was sacred to the Druids.

The oak family, of about 200 species, is known in many lands. From the Malay countries and China westward across the Himalayas and the Caucasus, and throughout most of Europe from Sicily to the Arctic Circle, it is familiar. The American *white oak* is very similar to the oak of England. The



(a) Bur oak (America). (b) Olive oak. (c) Chestnut oak. (d) Red oak (America).

best on clay or heavy soils; they do not yield acorns until they are twenty years old. The nuts are sometimes sweet, sometimes very bitter. In the south of Europe, they are boiled and eaten; acorns of the white oak are the ones chiefly used as food by man. Those of all varieties have, from the earliest times, been fed to pigs.

Oak timber has been valued for many centuries. In Westminster Abbey is the shrine of Edward the Confessor, the oak of



SEEDLING OAK
Photo: St. Clair



OAK IN SUMMER
Photo. F. J. Hosking



OAK IN WINTER
Photo. E. J. Hosking

holm oak of Europe is an evergreen, like the moss hung *live oak* of the Southern States of America. The *Turkey oak* is much planted as a park tree in England.

For most purposes, the timber of the English oak is considered the strongest and most durable, as well as the most beautiful. Besides timber, oaks yield, in their bark, the tannin used in leather manufacture; while the *cork oak* forests of Spain and Portugal are the main sources of commercial cork.

Scientific Names. The oak family is *Fagaceae*. The English oak is *Quercus robur*, the *ilex*, *Q. ilex*; the cork oak, *Q. suber*, the Turkey oak, *Q. cerris*.

OAK FERN. See **POLYPODIUM**.

OAKHAM. An Urban District and the county town of Rutland, with an area of 2250 acres and a population of 3191 in 1931. It is on the L.M.S.R. main line from London to Nottingham. Oakham's principal industries are those connected with the flourishing agricultural district of which it is the centre. There is one shoe factory, but an increasing amount of land is being set aside for commercial development. The town's historic interest centres principally upon the church, the ancient castle (a fortified manor house) and the school. The manor house at Oakham is mentioned in the Domesday Survey, and it is certain that a Saxon township was situated on this site. The castle was probably erected at the end of the thirteenth century and was a modification of the existing hall, in-

timately associated with the Ferrers family. The hall remains one of the best examples of twelfth-century domestic architecture in the country. Oakham School is a famous Elizabethan institution which was founded by Robert Johnson in 1584, and retains numerous antiquities of that period. Oak-



OAKHAM
Butter Cross and Stocks.
Photo. Frith

ham Church stands on the site of a Norman church, but the only Norman work remaining is the bowl of the twelfth-century font. Of a thirteenth-century church, however, the south porch and the chancel arch are intact.

Oakham is the most popular centre for the beautiful Vale of Catmose—a countryside



CARAVAN ENTERING AN OASIS
Photo: *Wide World*

which contains a surprising number of unspoilt villages, including the well-known Burley-on-the-Hill and Exton. The district is one of the most fertile arable districts of Britain, extremely well watered and finely timbered.

OAKUM. Originally the term for the coarse part of flax, the portion left after the fibres had been smoothed and separated. The name is now applied to hanks of fibre obtained by picking to pieces old tarred ropes. Oakum is used to close the seams of wooden ships to make them watertight, a process known as *caulking*; and plumbers utilize it for packing joints in waste-pipes in the process of sealing these joints. *White oakum*, made from clean, un-tarred rope, is sometimes used in dressing wounds.

OAR-FISH. One of the strangest fishes of the sea, the oar-fish, or Banks' oar-fish, is believed to be the

cause of many of the sea-serpent stories of seamen. It is a deep-water species and rarely seen. The body is of a dull silver colour, narrow and deep in shape. The back or dorsal fin commences with a number of separate rays at the head, and continues in a long series of connected rays to the tail. On or near the surface this fish, which is known to reach 20 ft. in length, swims in serpentine fashion, but does not seem to survive long near the surface and is seldom seen alive at close quarters.

Scientific Name. *Regalecus Banksii*

OASIS, ô'a sis or ô ay'sis Fertile spot in a desert, sometimes only large enough to sustain the lives of a few people, elsewhere of such extent and fertility as to support many thousands. The soil of deserts is often fertile but lacks the moisture to encourage plant growth, hence in places where springs, underground streams, or wells furnish water, oases develop. In ancient times the most celebrated oasis was Siwa in the Libyan Desert, 350 miles west of Cairo, where a splendid temple to Jupiter Ammon was built.

OATES, LAWRENCE EDWARD GRACE (1880-1912) Captain Oates, who had been educated at Eton and had served in the 2nd South African War, went with Captain Scott's expedition to the South Pole in 1910. He was one of the sledge-

party which actually reached the Pole, to find there the Norwegian flag of Amundsen. On



EL OUEN

This oasis town in the Eastern Erg, or great sand dune region of the Sahara, has subterranean rivers, and all gardens are sunk so that the tree roots may reach moist soil.

Photo: U. & U.

the return they were storm-bound, and Captain Oates, whose feet were giving out, regarded himself as prejudicing the others' chance of survival. Remarking that he "would be some time," walked from the tent to his death. Unhappily his self-sacrifice did not achieve its purpose. See POLAR EXPLORATION.

OATES, TITUS (1649-1705). A notorious perjurer. Son of an Anabaptist, he became an Anglican clergyman, was dispossessed of his living for perjury, and professed Catholicism. In 1678 he and Israel Tonge, another clergyman, claimed to have discovered a "Popish Plot" to murder Charles II in favour of James II and to massacre English Protestants; the Pope, Louis XIV and the General of the Jesuits were named its originators. Charles proved Oates to be lying, but Shaftesbury's agent Sir Edward Protestant England into unthinking panic after the investigating magistrate, Sir Edmund Berry Godfrey, had been found murdered. Various Catholics were executed on his false testimony.



TITUS OATES
(National Portrait Gallery)

"Dr Oates," as he now called himself, became a national hero and received a pension, and his most shameless lies were accepted by packed or panic-stricken juries. When, however, he accused the Queen of plotting the King's murder, he was promptly jailed by Charles II. The eventual triumph of Charles cost Oates his pension, and in the next reign he was imprisoned and annually pilloried and whipped at the cart's tail. On the accession of William III he was released from prison and received a pension.

OATH. A solemn promise in the Name of God or of some other power or thing which the person taking the oath holds sacred. In England, people are required by law to take oaths on certain occasions in a prescribed form. Thus a witness in a Court of law, before his evidence can be received, must say, "I swear by Almighty God that the evidence which I shall give shall be the truth, the whole truth, and nothing but the truth." In taking an oath, a copy of the New Testament should be held in the right hand and the hand raised above the head.



AN OASIS IN THE SAHARA
The women are washing clothes by the banks of a lake
Photo I. & U.

If the person taking the oath prefers, he may swear Scots fashion, with uplifted right hand without the Bible, or in the former English fashion, now discarded, by kissing the Book after the words have been pronounced by the person administering the oath. A Jew may use an Old Testament instead of a New Testament and may cover his head, as is the Jewish custom when performing a religious act. Mohammedans usually object to taking an oath, but if they swear, do so on the Koran. The Parsees swear on the Zend—Avesta. Buddhists have a long form of oath, calling on the "Three Holy Existences" to punish them if they speak falsely. A Chinaman swears by breaking a saucer and praying that, if he does not speak the truth, his soul may be broken like the saucer.

Affirmation. Where a person is required to take an oath and he either has no religious belief or is forbidden by his religion to take an oath (as Quakers are), he may decline to take the oath and may make a solemn affirmation instead, substituting for the words "I swear," etc., the words "I do solemnly, sincerely and truly declare and affirm."

Commissioner for Oaths. A person appointed by the Lord Chancellor for the purpose of administering oaths to people wishing to make affidavits (which see). He is always a solicitor.

OATS. One of the most important of the world's agricultural products, of the same botanical family as wheat, rye, barley, corn and rice. There are nearly one hundred varieties of oats under cultivation. The oat plant is very sensitive to climate and weather, but not to soil.

The origin of this grain is not positively known, but it is considered to be a development from certain types of grasses. Oats have been found in the prehistoric Swiss lake dwellings, and it is believed were grown in Northern Germany at an early date, probably having been carried there from Asia, which is reputed to have been the first home of this cereal.

Oats are best suited to a cool, moist climate, but are staple products throughout the temperate zones of the world. They are grown over about two million acres in Great Britain and Ireland, which produced 2,596,000 tons in 1934, 600,000 tons more than the production of wheat. Smaller

The oat crop of the world is about 4,000,000,000 bushels annually.

Scientific Names. Oats belong the grass family, *Gramineae*. The species from which most of the cultivated varieties have been developed is called *Avena sativa*.

OB (OR OBI o' be), RIVER. One of the largest waterways of Asia, rising in the Altai Mountains of Western Siberia and flowing into the Arctic Ocean. The river is almost two miles wide at its mouth and, not including its estuary, has a length of about 2500 miles and drains an area of 1,125,200 sq. miles. The Ob, with its chief tributaries (Tobol and Irtysh), has a navigable length of 9000 miles. 100 miles from its mouth it is blocked with



HARVESTING OATS IN ALBERTA
Photo. Canadian Official News Bureau

quantities are imported from various countries. Russia has 29,000,000 acres under cultivation and Germany 9,000,000 acres.

Cultivation of oats is carried out best on well-drained loam or clay soils, and may be grown after a clover or a root crop.

The oat stalk is from 2 to 4 ft. long when full grown, is very slender, and terminates in groups of graceful branches called spikelets, at the end of which the grain is found, encircled by protecting husks. These spikelets either spread out from all sides of the stem, or are grouped on one side. Each spikelet produces two grains unequal in size. In England and Germany, the average yield per acre is nearly forty bushels.

Oats are attacked by the same diseases and insects as other cereals.

Because they contain large quantities of starch and protein and other necessary food elements, oats in various prepared forms, especially oatmeal and rolled oats, are very nutritious. Oatmeal preparations also have the added virtue of low cost. Oats are the best of all grains for horses. No other cereal produces straw of such excellent feeding and fertilizing quality.

ice from October to June, but in the summer it is the means of transporting grain, dairy products, stock, wool and meat produced in Western Siberia.

OBADIAH, o bā dī' ā. A minor prophet of whom nothing is known. The Book of Obadiah, the shortest of the Old Testament, contains only 21 verses. Written after a sacking of Jerusalem—perhaps that which occurred after its capture by Nebuchadnezzar in 586 B.C.—when the Edomites exulted over the misfortunes of Israel (see Psalm cxxxvii. 7), it denounces that people and foretells their destruction (which actually occurred) and the occupation of their land by the Jews (still a matter for the future). There is much dispute among modern critics as to the date of the book and its literary integrity.

O'BAN. This Burgh and holiday resort of Argyllshire is 117 miles by rail from Glasgow. The town is of recent origin, although the district surrounding it is rich in historic interest. Its rapid growth is shown by the census figures, increasing from 1500 in 1851 to 5759 in 1931.

The principal objects of interest are the Municipal Buildings in Albany Street and



OBAN FROM SOUTH PIER

Photo: Oban Corporation

the Sheriff Court House. McCaig's Tower is on the crest of Oban Hill, whilst on the next hill, the ruins of the Hydropathic are a conspicuous landmark. Well-known places of scenic and other interest in the neighbourhood include Ben Bulbin, the Pass of Braider and Ben Cruachan, the highest mountain in the district. Oban is the headquarters of the Royal Highland and Lorne Gunthian Yacht Clubs.

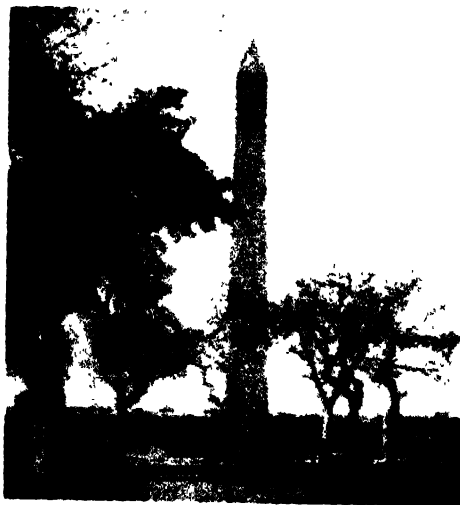
The Roman Catholic Cathedral, built of granite, was designed by Sir Giles Gilbert Scott.

OBLIGATO, *ob li gah' to*. In music, necessary to the performance; as opposed to *ad libitum*, at will. Bach's cantatas contain several cases where the voice parts are accompanied by a free solo for violin, viola da gamba or other instrument, which is nevertheless integral to the music, and therefore *obligato*.

OBELISK, *ob' el isk*. One of the characteristic types of monument erected by the ancient Egyptians and connected with the cult of the sun. It is a four-sided monolith, tapering to the top, which is surmounted by a pyramidion. Many such monuments were found in the ruins of Heliopolis, a city dedicated to the sun god. Here stood the famous pair of obelisks known as Cleopatra's Needles, one of which is now on the Thames Embankment, London, and the other in Central Park, New York.

Of the two obelisks before the temple at Luxor, dating from the time of Rameses II, one is still standing on the original site; the other is in the Place de la Concorde, Paris. Another famous obelisk, over 100 ft. in height, is that at the Church of St. John Lateran, Rome. It was set up by Thothmes III in the fifteenth century B.C. at Heliopolis, and carried to Italy by Constantine the Great, who re-erected it in the Circus Maximus. In 1589 it was removed to its present site by Pope Sixtus V. Still standing at

Heliopolis is a great obelisk erected by Userthesen I, a king of the twelfth dynasty. It is one of two that originally flanked the entrance to the sun god's temple. Besides those of Egypt, obelisks of smaller size have been discovered in the ruins of Nineveh and Nimrud, on the east bank of the Tigris.



THE OBELISK OF MATARIA

Mataria is on the site of Heliopolis, which was a great trading city at the time of the pharaohs of Egypt.

Photo: Tourist Development Association of Egypt

These monuments were cut from solid granite. Before erection, the obelisk was inscribed with appropriate hieroglyphics. These inscriptions gave the titles and achievements of the dedicating ruler, and sometimes stated the length of time it took to complete the monument.

OBERAMMERGAU, *o ber am' er gow*. A small village in the mountains of Upper Bavaria, celebrated for the periodical

performance of a Passion Play, which attracts visitors from all parts of the world. In 1633 the people of Ammergau, visited by the Black Death, made a vow that they would perform a drama of the Passion every ten years. Taking one of the religious plays then in existence (see PASSION PLAY), they gave the first performance in 1634. Since then the drama has been subjected to many revisions, and, as now given, it is a very moving and dignified presentation of the events connected with the Crucifixion of Christ. The characters in the drama are all taken by the villagers; the performance is reckoned by them as a purely religious exercise, and it is carried out with a deeply devotional simplicity.

(OBER)REALSCHULE, *ober reh ahl' shulē*. A type of German secondary school. See GERMANY.

OBESITY, *o be'sitē*. A term used in medicine to denote an excessive accumulation of fat in the human system. In the common acceptance of the term, obesity is not a disease, but it is a condition which causes more or less discomfort. The normal proportion of fat is from one-fifteenth to one-twentieth of the weight of the body, but this may vary without affecting the health. It is only when the accumulation of fat begins to affect the functions of the vital organs, especially the heart, that obesity becomes a disease. Obesity may occur at any period in life, but its effects are most frequently manifest after the age of 40.

In addition to the obesity which results from too little work and too much food, there are forms of obesity which result from some abnormality in one or more ductless glands. Among the glands whose action may produce obesity are the thyroid, the pituitary and the gonads. In obesity due to such abnormality, simple methods of reducing, such as dieting, combined with detailed directions for work or exercise, are of little service. Such cases require careful investigation.

Corpulent people are often anxious to reduce their weight, and many plans for accomplishing this have been devised. They all, however, depend upon diet and exercise. Some diets exclude all fats and also carbohydrates, that is, foods containing a large proportion of starch or sugar. Some authorities advocate the use of such acids as vinegar and lemon juice, but the excessive use of these is likely to injure the digestive organs. Exercise should be taken at such times as will best aid digestion.

Too strenuous reduction in weight is liable to undermine health, and it is wise to consult a doctor when a reduction is contemplated, so that a suitable diet may be recommended and one's physical condition ascertained.

OBI, *o' bi*. A Japanese silken girdle. Also a variant of the name *Ob*. See *OB*, *RIVER*.

OBJECT (Direct and Indirect). In grammar the *direct object* is that part of a sentence or clause which names the person upon whom, or the thing upon which, an action is performed. It is always a noun or noun-equivalent, and is found only after a verb denoting action. Examples: I wrote *the letter*; I will show *it* to you; Tell me *what you wrote*. The direct object may be found by asking the questions *whom?* or *what?* after the verb: thus—*What did I write?*—*The letter* (object).

A sentence or clause may also contain a noun or pronoun naming the person or thing indirectly affected by the action denoted by the verb. This is called the *indirect object*. Examples: I sent my *brother* a present; make *me* a parcel. It will be seen that the indirect objects in these examples mean, respectively, *to my brother* and *for me*.

OBJECTIVISM. A term used in philosophy to denote a theory of knowledge which presupposes the essential reality of the external world, as apprehended by the perceptions. It is opposed to "subjectivism," or the theory that knowledge can only consist of knowledge of the "states of mind" of the individual. The use of the term, therefore, is analogous to that of "Realism" as opposed to "Idealism."

See **REALISM**.

OBOE, *o' bo*. A wood-wind musical instrument of great importance in the orchestra. Its tone is nasal, of a beautiful quality, and capable of great expression. The oboe is



OBOE

made in three pieces, usually of boxwood, ebony, or rosewood, and consists of a conical tube about 21 in. long, tapering from a narrow mouthpiece at one end to a bell-shaped opening at the other. A smaller brass tube carrying a double reed fits into the mouthpiece, and in the upper and middle sections are holes which the performer opens or stops with his fingers. The oboe has a range of nearly three octaves. Since it has to be blown very lightly, the player is obliged to rest at intervals, in order to exhale.

The name *oboe* is from the Italian. The instrument is sometimes called *hautboy*, from the French *haut*, "high," *bois*, "wood," denoting the high notes produced by the instrument. In its simplest form, the instrument was known to the ancients, and may be seen in Egyptian and Grecian sculpture. Its immediate predecessor was the Shawm. The

oboe d'amore is an alto oboe (a third lower in pitch). The *oboe da caccia* is a small bassoon. Both are used in Bach. The tenor oboe is the *cor anglais*. The bass of the oboe family is the bassoon, there is also the double-bassoon, an octave lower. The oboe differs from the clarinet in having a double reed, and not a single reed.

OB'OLUS. A small coin used in ancient Greece. See CHARON.

O'BRIEN, WILLIAM SMITH (1803-1864). O'Brien, younger brother of Lord Inchiquin, claimed descent from Brian Boru. In 1828 he went to Westminster as a Tory and strongly opposed Daniel O'Connell. In 1846 he joined the Young Ireland party, which had recently renounced allegiance to O'Connell, and became their strongest advocate of violent measures, leading an armed mob against the police in 1848. For this he was transported. In 1856 he returned to Ireland with a free pardon.

OBSERVATORY. An institution or building supplied with instruments used in observing and studying astronomical or meteor-

used either visually or photographically. Auxiliary apparatus is provided for spectroscopic, photometric and interferometer work, and there must be measuring engines, sidereal clocks, chronographs and various specialized instruments.

The telescope is sheltered by a dome, which can be revolved so that its opening may point to any part of the heavens. The foundation upon which the telescope rests is deep and solid, since the least tremor seriously interferes with the observer's work.

Among Government observatories, Greenwich Observatory in London, founded by Charles II, holds an important position.

Two of the largest observatories in the world are the Lick Observatory and the Mount Wilson Observatory, both in the U.S.A. The latter is situated nearly 6000 ft. above the sea, and until recently contained the largest telescope in the world, with a 100 in. reflector. A 200-in. reflector for the telescope in the new Observatory at Mount Palomar, California, was made in England in 1936.

See ASTRONOMY.

OBSESSION. See NEUROSIS.

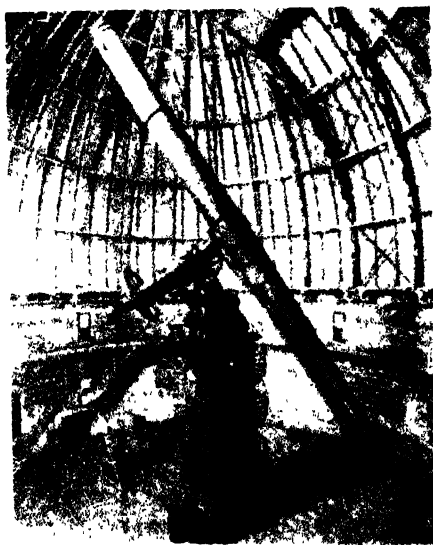
OBSID'IAN. A rock with a glass like texture. It contains the same substances as are found in granite, but owes its peculiar texture to the fact that it is poured out in a liquid state, and cools rapidly on the surface of the earth, and hence does not crystallize into feldspar, mica and quartz. It is usually black or red, or black and red streaked. Obsidian is very brittle and cannot be quarried like other rock.

OBSTETRICS, OR MIDWIFERY. The care of women in childbirth. Labour occurs normally forty weeks after the first day of the last menstrual period. After the infant is expelled, the after-birth occurs, which consists of the *placenta* and membranes by which the baby has been protected and nourished during the period of pregnancy.

There are three classes of complications which may occur during labour: haemorrhage; obstruction to the passage of the baby from abnormality in its size or position, or from malformation of the bones of the mother's pelvis, or from tumours; and thirdly, *eclampsia*, a condition characterized by convulsions in the mother, connected with impairment of the work of the kidneys, and extremely dangerous.

The lying-in period should be never less than ten days, and often has to be very much longer. The complications which may prove dangerous in this period are haemorrhage immediately after the confinement, and septic infection or *puerperal fever*.

OCARINA, *oh a re' na* (Ital. oca, goose). The name applied to a musical instrument



TELESCOPE AT YERKES OBSERVATORY,
WISCONSIN, U.S.A.

ological phenomena, or both. The first European observatory built for the purpose was that erected in Nuremberg by Bernhard Walther in 1472.

Modern astronomical observatories are equipped with large telescopes, usually mounted equatorially, transit instruments, and meridian circles. The large telescopes may be refractors, that is, telescopes with lenses, or reflectors, and usually they can be

originating in Austria or Switzerland, and given from its slight resemblance to a goose egg. In its simplest form, it is a hollow piece of moulded clay, with a mouthpiece on



OCARINA

one side and holes for keys. In the improved instrument, several different sizes of which are made, the holes are replaced by a row of

keys, and at one end is a piston for modifying the note. The various sizes are needed to give variety of sound, as the compass of the ocarina is small and its tones are monotonous.

OCCAM, or OCKHAM, WILLIAM (d. 1349) Philosopher and theologian, born at Ockham in Surrey. In the famous controversy between Nominalism and Realism he took the side of the Nominalists. He wrote in Latin.

OCCIPITAL, *ok sip' it al*, **BONE**. One of the eight bones in the head. See **HEAD**.

OCCULT, *ok' ult*. A term referring to the types of learning that sought a knowledge of the hidden or supernatural world. The pursuit of the occult sciences changes under different influences. It embodies the general traditions of the Orient—Babylonia, Egypt and India—with the stages of adeptship and the insight gained by rising above the limitations of the human senses. With this is combined the art of predicting human destiny from the positions of the stars and planets at the time of one's birth (*astrology*). Occultism in the realm of physics and chemistry was known as *alchemy*, and its devotees searched for the secret of the transmutation of metals, particularly of the base metals, into gold. Developed together, the alchemistic, the astrological and the general "spiritual" pursuits—with the underlying idea of penetrating the secrets of hidden forces, possibly by the aid of spirits—formed a mystic and secret tradition of occult learning. Such learning was handed on by tradition and by the initiation of disciples into the mysteries; the body of doctrine bears the name of *cabal*, or oral secret tradition, which is more particularly applied to the Jewish lore in its later form.

Revivals and survivals of such cults are known down to the present time.

OCCULTATION, *ok ul' tay' sh'n*. When the sun is hidden, wholly or partially, by the moon, the phenomenon is called an *eclipse*, but the same occurrence with reference to a star or a planet is known as *occultation*, which means, literally, "hiding, or concealing." It is a much more common occurrence

than an eclipse, for the moon in its revolution is constantly passing between the earth and some bright star. Similarly, there may be occultations of stars by the planets. See **ECLIPSE**.

OCEAN. There is, strictly speaking, only one ocean, covering three-fourths of the globe; but it is usual to recognize three—the Atlantic, 42,000,000 sq. miles; the Pacific, 69,000,000 sq. miles; and the Indian, 29,000,000 sq. miles. Sometimes a fourth, the Southern or Antarctic, is cut off from the others by a northern boundary joining the southern points of South America, South Africa, Australia and New Zealand. So defined, it has an area of 8,000,000 sq. miles.

The land masses of the world are so closely grouped together that it is possible to speak of a *land hemisphere* and a *water hemisphere*, with New Zealand the approximate centre of the water hemisphere, as London is of the other.

The total area of the oceans is estimated to be 141,333,882 sq. miles, but over 10,000,000 sq. miles cover the continental shelves, and the true ocean basins are therefore about 131,000,000 sq. miles in area. More than 2 miles—12,600 ft.—is the average depth, which is over five times the average elevation of the land. The greatest depth thus far discovered is over 6 miles—34,416 ft.—a sounding made in the Mindanao Deep, off the Philippine Islands. If the highest mountain, Mount Everest of the Himalayas, could be moved to this point and dropped to the bottom, its summit would be over 5000 ft. below the surface.

Soundings have revealed that the ocean floor has mountains, valleys, plateaux, plains, ridges and chasms; but that, on the whole, it is far smoother than the surface of the land. In the deep sea, everything is quiet, however stormy the water may be on the surface, the slight ocean currents causing comparatively little erosion.

Depths over 3000 fathoms are called *deeps*. Some sixty of these are known, with a total area of about 10,000,000 sq. miles. Most of them lie near continental edges—areas of shallow water sometimes extending far into the oceans, e.g. the "shelf" which surrounds the British Isles, or that which connects the Malay Peninsula and Borneo.

Many kinds of deposits, muds and ooze, cover the ocean floor. Some are of terrestrial origin, and others are derived from remains of minute and often microscopic surface organisms.

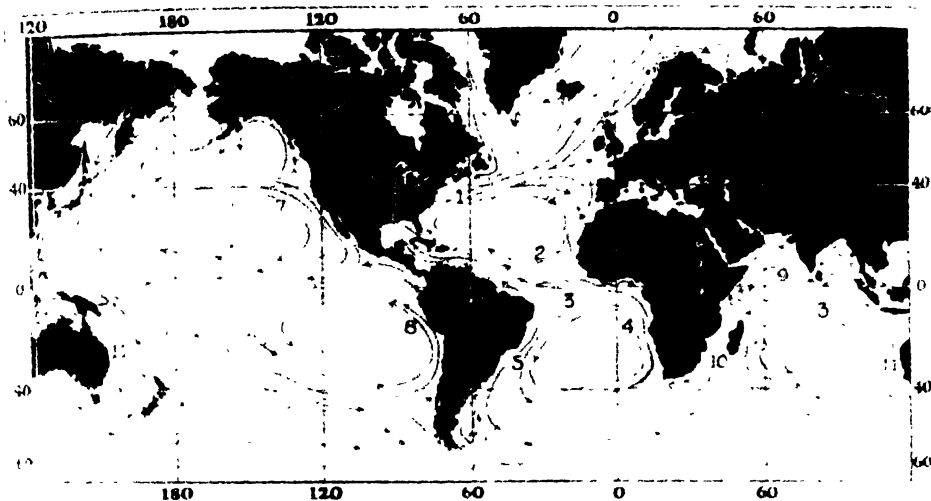
Sunlight cannot penetrate the water for more than a quarter of a mile, and therefore in the deepest parts of the ocean there is no plant life. Where the depth is not beyond the limits to which light can reach, however,

there is generally great variety of plant life.

Since there is no vegetation to feed them, animals of the deep sea exist by preying upon one another. Even the greatest depths have been proved to have living creatures, though, inevitably, but little is known of them.

Pressure and Temperature. The greater the depth, the heavier is the pressure of the water, the pressure increasing at the rate of a ton to the square inch for every 1000 fathoms (6000 ft.) of depth; and animals

two theories advanced to explain the presence of salt in the sea. One holds that the salt was there from the beginning; the other supposes that the rains washed it from the land, and it was carried by the rivers to the sea, where evaporation caused it to concentrate. These theories are based on the two hypotheses for the origin of the earth—the planetesimal theory and the molten gaseous theory, and until one or the other of these theories can be proved, all conclusions made from them are purely conjectural. According to the planetesimal



PRINCIPAL OCEAN CURRENTS OF THE WORLD

1. Gulf Stream. 2. Canary Current. 3. Equatorial Current. 4. Benguela Current. 5. Brazilian Current. 6. Japan Stream. 7. California Current. 8. Peruvian Current. 9. Monsoon Current. 10. Mozambique Current. 11. Australian Current. (Wavy line = calms; broken line = limit of icebergs.)

adapted to withstand a certain pressure cannot live where pressure is either greater or less. If they should attempt to swim deeper, they would be crushed by the weight of the water; contrariwise, when deep-sea animals reach the surface, they are probably killed through relaxation of pressure.

The surface water of the ocean varies in temperature with the latitude; so we find the hottest water (about 80° F.) at the equator, and the coldest at the poles. At a depth of several hundred feet, the ocean, even in the tropics, becomes extremely cold, and it is close to freezing in the lowest depths.

This icy water, being heavy, has sunk in polar regions and spread over the ocean floor. There is no danger of the ocean freezing, because the water is in perpetual motion through waves, tides and currents, and ice itself is, of course, lighter than water.

The Origin of the Ocean's Salt. There are

view, as the water oozed out of the material which was to become the earth, it had a solvent action and brought with it the salts from the solids as the ocean formed, making the ocean salty from the beginning. The other theory maintains that the earth was molten and surrounded by a gaseous atmosphere, which contained much saline material and water vapour. As solidification took place, and the atmosphere relinquished its salt to the crust of the earth, the water vapour condensed and settled in the depressions. Rain fell and, by means of its erosive action, leached the salt from the land; then the rivers carried it to the sea.

Ocean Currents. There are great streams flowing through the ocean, and some of them are almost as distinctly divided from the surrounding waters as are the rivers from the land. These currents constitute a regular system of circulation in each ocean; the Atlantic and Pacific each have two systems,

the northern and the southern. Ocean currents are classified as *warm* and *cold*, and from another aspect as *surface currents* or *deep-sea currents*. *Drift* is a general movement of water on the surface, and it has no distinct bounding lines. A current whose waters are distinctly separated from surrounding waters is called a *stream*.

The chief cause of ocean currents is the sun, which warms the water at the surface and also hastens evaporation; the latter increases in rapidly as the equatorial regions are approached. Other causes are tides, irregularities of the coast line, winds and the rotation of the earth. As water cools, it contracts and becomes heavier until it reaches the temperature 39° F. Sea-water of average salinity freezes at about 28° F. (See ICE.) A number of records of the temperature of the ocean at different depths prove conclusively that the influence of the sun's rays does not extend much below 1000 ft.; at greater depth, the temperature is practically uniform. In the general system of ocean currents, the warm water on the surface moves from the equatorial toward the polar regions, where it is cooled, settles toward the bottom, and moves again toward the equator. Hence, in every ocean, except possibly the Indian, there is a deep-sea, cold current moving slowly toward the equator, and warm surface currents moving toward the poles.

Were it not for the rotation of the earth, these currents would move directly north and south. At the equator the rate of rotation is a little over 1000 miles an hour; at the poles it is nothing. Currents flowing toward the poles are flowing into regions whose velocity of rotation is less than that of the regions they have left; consequently, their velocity eastward is greater than that of the surrounding water, and they flow toward the north-east, as in the case of the *Gulf Stream*. This flow is aided by the conformation of the land. Winds also exert a strong influence upon these surface currents, and in all oceans their direction is approximately the same as that of the prevailing winds.

Currents flowing toward the equator are flowing into regions whose eastward velocity is greater than that of the regions they leave, and they are crowded against the eastern coasts of the continents, like the *Labrador Current*.

North of the equator the trade winds drive a current westward, forming the *North Equatorial Current*; when this current reaches the West Indies it divides, a part of it entering the Caribbean Sea and the other part bending northward and joining the *Gulf Stream*, which issues from the Gulf of Mexico

and follows the coast northward to Cape Hatteras. Then it turns eastward and spreads out until it becomes a fan-shaped drift carrying warm water and winds to the coast of Europe, and greatly moderating the climate of the northern part of the continent. One branch passes along the coast of Norway into the Arctic Ocean, and the other turns southward and joins the *North Equatorial Current*. Within this system of currents is a body of water without motion, here seaweed collects in vast quantities, forming what is known as the *Sargasso Sea* (which see). The currents of the North Atlantic flow clockwise along the coast. The *Labrador Current* from Arctic regions is one of the chief causes of the fogs of Newfoundland by its contact there with the warm *Gulf Stream*.

The system in the South Atlantic is similar to that already described, except that the open ocean at the south makes the south current corresponding to the *Gulf Stream* less distinct. The *South Equatorial Current* is supplied from the cool *Benguela Current*, off the west coast of Africa. A part of the *South Equatorial Current* turns northward off the coast of Brazil and joins the *North Equatorial Current*. In the South Atlantic the currents move anti-clockwise.

The currents in the North Pacific are similar to those in the North Atlantic, only they are less definitely marked, owing to the greater size of the ocean. Here the *Kuro Siwo*, or *Japan Current*, corresponds to the *Gulf Stream*, and produces a warming effect upon the climate of the west coast of North America, similar to that produced by the *Gulf Stream Drift* upon Europe.

In the South Pacific the currents are, again, less clearly marked, owing to the great expanse of water, but the circulation is similar to that of the other oceans.

The system in the Indian Ocean is similar to that of the South Pacific. There is a current of cold water along the west coast of Australia that is noticeable along the east coast of South Africa. The *South Equatorial Current* turns southward off the coast of Madagascar, and a current of warm water flows through the *Mozambique Channel*. The north-east monsoon may reverse the currents in the North Indian Ocean; otherwise they are similar to those in the North Atlantic. Currents in the Southern Ocean are mainly drifts from west to east.

Ocean "Lanes." There are roads on the sea, known as steamship lanes, almost as definitely fixed as those on land. In one of the main-travelled lanes, no steamer is ever very far from another, but away from the regular track, a ship might drift for long without being seen.



MARINE PLANTS AND ANIMALS

1. *Alaria esculenta*; called banware, badder-locks, or murlins. 2. Jelly-fish. 3. Root-mouth jelly. 4. Bladder-wrack. 5. Sugar wrack. 6. Shrimp. 7. Giant perch. 8. Hippocampus (sea-horse). 9. *Asco-phylum nodosum*. 10. *Prionitis lanceolata*. 11. *Sargassum Montagnei*. 12. Dulse. 13. Water grass. 14. *Gigartina radula*. 15. *Massa reticulata*. 16. Limpet. 17. Yellow coral. 18. *Voluta junonia*. 19. *Sigaretus perspectivus*. 20. *Conus floridanus*. 21. Star-fish. 22. Sea rose. 23. Nail sea rose. 24. Little star-fish. 25. Horse sea rose. 26. Hydroid coral. 27. Crab. 28. Sea mussel. 29. *Scolec communis*.

OCEANIA, *o she an' ia*. A name employed by geographers to designate that portion of the South Pacific Ocean which contains most of its islands. See **PACIFIC ISLANDS**.

OCEANIDS, *o se' an idz*. See **NYMPHS**.

OCEANOGRAPHY, *o shān og' ra fe*. That department of geography which embraces a study of the oceans. It deals with tides and currents, the composition, colour, and density of sea-water, marine life and its distribution, the depth of ocean waters, their effect on climate, and kindred topics.

OCELLI, *o sel' i*. The very small, simple eyes of certain insects. See **INSECT**; **ANT**.

OCELOT, *o' se lot*. A medium-sized animal of the cat family, known as the *leopard cat*, native to America. It lives in forest trees and is an agile climber. Its food consists of



OCELOT

Photo: Visual Education Service

mice, birds and monkeys. The ground tint of the fur is smoky-pearl in colour, and black spots develop, from mere dots on the legs and feet to large shell-shaped spots on other parts of the body. The nose is pink, and the eyes are large and translucent.

Scientific Name. The ocelot belongs to the family *Felidae*. It is classed as *Felis pardalis*.

OCHRE, *o' ker*. A mineral which, when ground to a fine powder and mixed with linseed oil, forms paint. It is a combination of iron and lime, formed in bogs and marshes by water containing the iron in solution. This substance often mixes with clay and colours it yellow. When dried and ground, this clay forms the so-called "yellow ochre" of commerce.

Ochres vary in colour from a pale yellow to brownish-red, and some yellow ochres turn

red when heated to a high temperature. See **PAINT**.

O'CONNELL, DANIEL (1775-1847). An Irish patriotic leader and orator, generally known as "the Liberator." He was born in County Kerry, was educated at the exiled Roman Catholic colleges of Saint-Omer and Douai in France, and admitted to the Irish bar in 1798, where he rose to eminence. In 1828 Clare County elected him to Parliament, where he later became a powerful influence. Through his eloquence he was instrumental in obtaining the passage of the Catholic Emancipation Act of 1829 which repealed the penal laws against Roman Catholics. In 1841 he began a second movement for repeal of the Union, organizing huge mass meetings, yet always opposing the use of force. In 1844 he was arrested and imprisoned for some months. He died while on pilgrimage to Rome.



DANIEL O'CONNELL
Photo: Brown Bros

O'CONNOR, FEARGUS (1794-1855). An Irish lawyer and former Member of Parliament. He joined the movement known as Chartism, which was partly due to the realization among the working class that they had in no way benefited from the Reform Bill of 1832, the passing of which they had regarded as a triumph. They demanded a "People's Charter," granting manhood suffrage, voting by ballot, equal electoral districts, annual parliaments, payment of Members, and the abolition of property qualification. O'Connor was one of the "physical force" Chartists, and frequently quarrelled with those of his colleagues who relied on reasoning powers. He was twice jailed and presided over the mass meeting at Kennington in 1848. This was completely overawed by Government precautions. O'Connor soon after went insane.

O'CONNOR, RODERICK or RORY, KING or CONNAUGHT (d. 1189). The son of Turloch, Ard-Righ or High King of Ireland; he regained his dead father's position in 1166, when he slew Murtach MacLochlainn of Ulster. He drove Dermot MacMurrough from the Kingdom of Leinster. Dermot sought help from England, and Rory was defeated near Dublin by the Anglo-Norman array in 1171. Four years later he did homage to Henry II, receiving in return

recognition as High King. He retired eventually into a monastery.

O'CONNOR, THOMAS POWER (1848-1929) A journalist and Irish Nationalist leader. Because of his long period of service as a member of Parliament, he became popularly known as "father of the House of Commons." He was first elected to Parliament



T. P. O'CONNOR

as member for Galway in 1880, and, at the next election, he was returned for both Galway and Liverpool. He chose the latter, and was returned for Liverpool at each subsequent election.

T. P. ("Tay Pay") O'Connor, as he was generally known, entered journalism as a junior reporter for *Saunders' Newsletter*, a conservative journal in Dublin.

Three years later, in 1870, he removed to London and engaged in newspaper work on the *Daily Telegraph*, in the London office of the *New York Herald*, and on other journals. In 1888 he founded and became the first editor of the *Star*, and later performed the same services for the *Sun*, the *Sunday Sun*, and *T. P.'s Weekly*. In 1923 he became editor of *Cassell's Weekly*, retaining also his connection with *T. P.'s Weekly*.

On his entrance to Parliament, O'Connor became active in the cause of Irish nationalism, and was prominently identified with the party led by Parnell. He visited the United States in 1881, and again in 1906, to lecture on Home Rule and raise money for the Irish cause. In 1883 he was elected president of the Irish National League of Great Britain. His principal publications include *Lord Beaconsfield: A Biography*; *The Parnell Movement*; *Gladstone's House of Commons*; *Some Old Love Stories*; *Napoleon*; *The Phantom Millions*; *Sketches in the House*; and *Sir Henry Campbell-Bannerman*.

OCTAVE. Stretch a fine wire tightly between two supports, and pluck it with the fingers. It vibrates and gives out a musical sound. Now place a sharp object, as a knife blade, under the exact centre of the wire, and with the finger cause one half to vibrate. The sound which is given out is an octave higher than that produced by the longer wire; that is, it is the eighth tone above it in the scale. The two tones resemble each other very closely—in fact, when a tone and its octave are sounded together, it is difficult to distinguish them. All tones which stand in the

relation of octaves to each other bear the same name; each C in the scale is separated by one or more octaves from each other C, and each *doh* by an exact number of octaves from each other *doh*. This is true of all other letters and tone names. The octaves above middle C are written c^1 , c^2 , c^3 , etc. Middle C is written c . Octaves below Middle C are written C, CC, CCC, etc. See MUSIC, SCALE.

OCTAVIA, *ok tay' via*. A Roman matron, sister of the Emperor Augustus, who first married the consul Marcellus. In 41 B.C., she married Mark Antony to secure his reconciliation with her brother (see ANTONY, MARK). Octavia was noted for her virtue and beauty, but Antony forsook her for Cleopatra, queen of Egypt (see CLEOPATRA). During the Civil War in the year 32 B.C., Antony divorced Octavia, but her noble character was shown in her devotion to his children, as well as to her own.



OCTAVIA

Fifth-century bronze, now in the Louvre Museum.

Photo. Mansell

OCTAVIAN, *ok tay' vian*. See AUGUSTUS.

OCTAVO, *ok tay' vo*. Term denoting a book composed of sheets of paper folded three times to make eight leaves; hence used of a particular size of book or page (8vo. or 8°). Novels are usually published in *Crown octavo*, giving a page 5 in. by 7½ in. In the U.S.A. this size is often called *duodecimo*. See FOLIO.

OCTOBER. The tenth month of the year. Its name is from the Latin for "eight," for in early Roman times, it was the eighth month, and only with the revision of the calendar by Julius Caesar did it receive its present place. More than once the Senate tried to rename it in honour of the Emperors, but none of the names they gave became popular, and the month continued to be misnamed October. Its special gem is the opal or tourmaline.

OCTOPUS. A genus of mollusc which, from its repulsive appearance and the records, often well authenticated, of attacks by the larger kinds on divers and fishermen, has gained an evil reputation.

The common octopus has a soft, pear-shaped body joined to the head by a short neck. The name, which is derived from Greek *oktopous*, "eight-armed," refers to the

eight movable arms, or tentacles, surrounding the mouth. These arms are joined at the base by a web, and on the under side of each there are two rows of powerful sucker disks. With these the octopus seizes and holds its prey, which is swept into the horny jaws of the mouth and devoured. Crabs and lobsters are its favourite food. The octopus is provided with a funnel, or siphuncle, beneath the head, which it uses for two purposes. A black fluid, secreted by a gland near the liver, is squirted out of the funnel when the animal wishes to elude pursuers, as the fluid forms a dark cloud that conceals it



from view. The octopus also draws water into a body cavity, and then forces it out suddenly through the funnel, a process which thrusts its body backward and aids it in swimming. Some species also swim at a considerable speed with the help of their webbed arms. Ordinarily, the octopus moves on the sea bottom, or climbs over rocks by means of its sucker disks.

Octopuses are found chiefly in the Mediterranean and Chinese Seas, and off the coasts of the West Indies, Hawaiian Islands, and Western North America. The largest specimens may reach 14 ft. from tip to tip of extended arms. Most octopuses, however, are about the size of one's fist. Their flesh is greatly liked by peoples of the Mediterranean coast and by the Chinese. The octopuses are placed by zoologists in the class *Cephalopoda* with the cuttlefish, nautilus, and squid (see separate articles). See also MOLLUSCS.

Scientific Names. The best-known species is the octopus of the Mediterranean, *Octopus vulgaris*. *O. granulatus* is a tropical species.

ODDFELLOWS, INDEPENDENT ORDER OF. A benevolent and fraternal order. As to its origin there is uncertainty, though it was founded in England probably not before

the eighteenth century. The idea of mutual relief and benefit to members attained great popularity, and various branches or lodges grew up in different cities of England, each of which refused to admit the superior rank of any other. In time adjustments were made, but it was not until 1814 that the Manchester Unity of the Independent Order of Odd-fellows was finally organized. This society, which has branches in various countries, has about 1,350,000 members. Regular contributions are made by members, who are entitled to "sick" and other benefits.

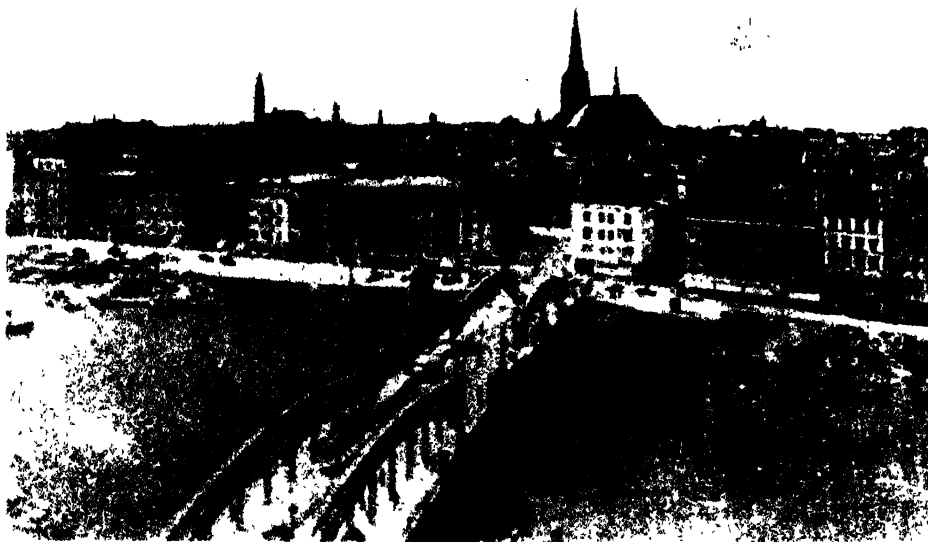
ODE. In Greek literature, the name was applied to any poem that was sung to a musical accompaniment. Two forms of odes were common among the Greeks, that in which the stanzas were regular and uniform, and that in which irregular divisions, known as strophe and antistrophe, were intended to be sung by two choirs answering each other. The famous odes of Sappho were of the former kind, those of Pindar of the latter, while Horace's odes followed those of Sappho rather than those of Pindar. But though Pindar's odes were irregular in the sense that the separate parts did not all conform to a single pattern, it is now realized that each part had an inner harmony of its own.

When Pindar came to be imitated in the seventeenth and eighteenth centuries, it was generally thought that the claim to be writing a "Pindaric ode" entitled a poet to express himself in what was almost free verse. Cowley set a fashion for this sort of writing in England, and it became very popular. Later, Gray in his "Progress of Poesy" and "The Bard" attempted to write the ode with greater regularity, and he was followed (with considerable success as regards regularity, but little as regards poetry) by Mason and Akenside. The odes of Collins are mostly written in imitation of a different model. As might be expected, the odes of the Romantic poets, Wordsworth, Coleridge, and Shelley are mostly in irregular form. The odes of Keats, though adhering to a strict formal pattern, are not written in imitation of classical forms.

Some of the greatest of English poetry, from Spenser's "Prothalamium" and "Epithalamium" down to Wordsworth's "Ode on the Intimations of Immortality" and Keats's "Ode to a Nightingale," has been written in one or another form of the ode.

ODENSE, o' then say. See DENMARK.

ODER, o' der, RIVER. An important waterway of Germany. It rises in Moravia, Czechoslovakia, and after flowing north-westward through Germany, empties through three arms into the Baltic Sea, by way of the Stettiner Haff. At the head of this inlet is



STETTIN ON THE ODER
Photo German State Railways

the port of Stettin, to which ocean-going vessels can ascend. Important cities on its banks include Frankfurt and Breslau. The total length of the Oder is 360 miles, and it drains an area of over 43,000 square miles. Because the navigable parts of the Oder system provide access to the sea for more than one nation, they were internationalized by the Treaty of Versailles. In 1936 Germany reasserted her sovereignty in German waters.

ODER. A Norse god. See FREYJA.

ODESSA, *o des' a*. See UKRAINE.

ODIN, *o' din*. The chief god of the ancient peoples of Northern Europe. The Scandinavians called him *Odin*; the Germans called the same god *Wuotan*, or *Wodin*. He was the father of all the gods of Norse mythology, and was the personification of universal wisdom and victory. His son, *Thor*, was the god of war, thunder, and agriculture. His court was held in Asgard, the equivalent of the Greek Olympus. Valhalla, the hall of the chosen slain, was one of the most important palaces in Asgard. The earliest form of worship of both Odin and Zeus was human sacrifice. In earliest times, Odin was a god of the common people, but later was worshipped principally by warriors and members of noble families. Wednesday received its name from Odin (Wodin).

ODO OR EUDES, KING OF FRANCE (d 898). Odo, Count of Paris, son of Robert the Strong, fought valiantly against the Northmen, holding Paris against their full force for a whole year in 885 and 886. In consequence, he was acclaimed in 888 King of France, and Paris took a predominant position among French cities. His power was challenged by the Carolingians, and a long struggle ended in compromise with Charles the Simple. After his death his lands eventually passed to his great-nephew Hugh Capet, Duke of the French and later the first Capetian King of France.

ODOACER, *o dô ay' sei* (about 434-493). The first barbarian ruler of Italy, following the overthrow of the Western Roman Empire. He was born in the district bordering the Danube. Though his parentage is uncertain, it is probable that he was the son of Aedico, a chief of the Scyrii. When about thirty years of age, Odoacer left his country and entered the service of Italy. In the year 475, the Emperor Nepos was driven into exile by the rebel Orestes, who placed his son, a lad of 14, on the throne. The new Emperor, Romulus Augustulus, as he was called, was a weakling, and Odoacer, who had risen to power and position among the barbarian mercenaries, seized Orestes and had



SCENE FROM THE ODYSSEY

On this Greek vase from Vulci, Odysseus is shown bound to the mast of his ship, with the Sirens trying to allure him.

Photo: Mansell

him beheaded; Romulus was dethroned, and Odoacer was accepted as king.

For thirteen years he ruled with undisputed power, and although hated by the native Italians, he ruled them justly and well! He divided one-third of the country among his followers, and to strengthen his position, appealed to the Byzantine Empire for support and sanction of his rule as king, declining to adopt the higher title of Emperor. The Byzantine Emperor, Zeno, while pretending to be satisfied with Odoacer's claims and conferring on him the title of Patricius, instigated an invasion of Italy by Theodoric, the Ostrogoth king. Odoacer was defeated and retired to Ravenna. He agreed to capitulate upon Theodoric's promising to share the kingdom of Italy with him. Inviting him to a banquet to ratify the agreement, Theodoric slew him with his own hand.

ODYSSEY, *od' is se*. One of the epics which long tradition—questioned by recent criticism—ascribes to the poet Homer. In it are described the wanderings and the sufferings of Odysseus (Ulysses) on his return from the Trojan War. Much of the hero's difficulties were due, the poem relates, to his opening a bag given him by the god Aeolus, in which storms and tempests were confined.

The *Odyssey*, like the *Iliad*, is in twenty-four books. Though, like the other great

epic, it is attributed to Homer, the same question as to its real authorship exists. By some scholars it is believed that the *Odyssey* is an outgrowth of the tales of early navigators of the Mediterranean, or an allegory based on them, though it is by no means certain that it has even that basis in history. It is full of mythology, and its heroes seem often conceived in the shape of gods of an earlier time. See HOMER.

OEDEMA, *e' dem a*. See DROPSY.

OEDIPUS, *e' dip us*. A hero of Greek legend. Because it was foretold that the son of Laius, king of Thebes, would kill his father, marry his mother, and bring trouble on his native city, the father ordered his child to be exposed and left to die. A shepherd of King Polybus of Corinth, however, found the boy and carried him to Polybus, who adopted him as his own son, calling him Oedipus (meaning "swollen foot"). Years later, an oracle repeated the prophecy of disaster, of which Oedipus had up to that time known nothing; and to avoid being led into the revolting crimes, Oedipus left Corinth.

and the foster parents whom he thought his real father and mother. As he wandered along the road to Thebes, he met King Laius, whom, after a hasty quarrel, he killed with his attendants, never suspecting that the old man was his father and the King of Thebes. Having guessed the riddle of the Sphinx, Oedipus was given the promised reward—the throne of Thebes, with Queen Jocasta as a wife. Thus he had fulfilled two parts of the prophecy



OEDIPUS AND THE SHEPHERD
Marble by Antoine Chaudet

Photo: Mansell

For some time the king and queen lived happily together, and four children, Eteocles, Polynices, Antigone and Ismene, were born to them. Then a plague came upon Thebes, and the oracles, when consulted, declared that it should cease only when the murderer of King Laius was sought and punished. The whole story was disclosed, and Jocasta, in despair, hanged herself, while Oedipus put out his eyes that he might look no more upon the horror to which a cruel fate had condemned him.

OENONE, *e no' ne*. See **PARIS** (Mythology).

OENOPION, *e nop' ion*. See **ORION** (mythology).

OESOPHAGUS, *e sof' a gus*. See **DIGESTION**; **ALIMENTARY CANAL**.

OFFA, **KING OF MERCIA** (d. 796). In 757 Ethelbald of Mercia, after being defeated at Leckington by the West Saxons, was murdered. His cousin Offa defeated Beornred, who had usurped the throne, and was crowned king of Mercia. A collection of oldships rather than a geographical entity, depended almost entirely for its power on the abilities of its King, and under Offa it reached its widest limits. He made himself overlord of Kent by his victory at Otford in

774 and annexed East Anglia. He defeated the West Saxons at Bensington in 777 and added part of Wessex to Mercia, whose western boundary he also extended at the expense of the Welsh. Offa's Dyke, the great earthwork of which part still remains, ran from the Dee to the Wye to protect his Marches. He held diplomatic relations with Charlemagne, whose coinage he imitated. His written code of laws, the first known in Mercia, is now lost, but it is said to have been used as a model by Alfred of Wessex. His ability is unquestioned; his character is more uncertain. He has been described as virtuous and pious, but his founding of St. Alban's Abbey in 793 is said to have been in expiation of the murder, at the instigation of his Queen, of his young guest, Ethelbert, King of East Anglia. Offa must have been something over 60 at the time of his death.

OFFENBACH, *of' en bah'k*, **JACQUES** (1819-1880). A composer of French operetta, best known for his tuneful and sprightly *Tales of Hoffman*. Offenbach was born at Cologne, of Jewish parentage, but spent most of his working life in Paris. In 1833 he entered the Paris Conservatoire, and after a short time in the orchestra of the Opéra



OFFA'S DYKE NEAR MONTGOMERY

Photo: Taylor

Comique, he became director of music at the Théâtre Français. During this period, he began his work as a composer and produced a long succession of operettas, which include *The Two Blind Ones*, *Orpheus in Hades*, *Bluebeard*, *The Grand Duchess of Gérolstein*, *The Brigands*, and *Myriame and Daphne*.

OFFICE OF WORKS. A department of the British Government, formed in 1851 with the title "Board of Works and Public Buildings." Its function is to supervise the fabric of all State buildings (not specially assigned to other departments), Royal palaces and Royal parks. Like the Board of Education, the Board of Works and Public Buildings never meets, the responsibility for administration being undertaken by the First Commissioner of Works, a Cabinet Minister.

OFFICER. A person commissioned by the Crown or by the Government in power at the time, to carry out a public duty; or anyone ranking above the crew in a ship. The term *Officer of the Peace* was once used to describe a constable. In the British Navy, Army and Air Force, officers are *commissioned* by the King, that is to say, they receive individually a signed parchment commission, empowering them to bear arms in defence of the Realm. In the Dominion of Canada, officers of the Active Militia and Royal Canadian Air Force are commissioned by the Canadian Government through the Department of National Defence, chiefly from graduates of the Royal Military College of Canada, Kingston, or from men who have served in the equivalent forces of the Empire. By virtue of his commission, an officer is given the power to issue orders and exercise authority over those placed under him. See also NAVY; ARMY; ROYAL AIR FORCE.

OFFICERS' TRAINING CORPS. Organizations at universities and educational establishments, recognized by the War Office or Dominion Government, in which students are grounded in discipline and the rudiments of military defence, with a view to creating a supply of officers for the Territorial Army and a Reserve of Officers in event of war. The Canadian Officers' Training Corps consist only of university contingents, but are otherwise similar to those in Great Britain as regards training and examinations; other Dominions and Crown Colonies have officers' training corps, or recognize the principles implied, even where service is compulsory, as in the Union of South Africa.

OFFICES AND OFFICE ORGANIZATION. Within comparatively recent years the organization and equipment of the business office have been considerably improved. One result of the great extension in the use of

office machines has been to necessitate a study of office technique from its foundations. The introduction of machines results in simplification of processes and leads to consideration being given to the methods of routine work. Machines have materially improved the efficiency of method and the individual efficiency of office workers, with the result that office technique is becoming more and more an exact science and being studied in an organized manner. The effects of machines on staff numbers and outlook, and the comparative value of male and female staff, may be said to be the two most controversial questions of scientific management to-day. The personnel of the modern business office—with its office organizers and supervisors, staff trainers and managers—differs materially from that of but a few years ago. The actual rooms, too, have changed considerably for the better since the realization of the important part played by efficient lighting, heating and ventilation in the successful functioning of a business. Even appearances are now carefully considered in connection with the office, as it has been realized that a well-furnished and suitably equipped office creates an atmosphere of efficiency which stimulates the staff and begets public confidence.

Space will permit of only a very brief note of the main principles of office organization.

Office Layout. The modern plan is to arrange an office or suite of offices as far as possible according to the "flow" of the work undertaken in them, but there are exceptions to the rule. Many organizers prefer that all office machinery should, if possible, be kept together, on account of noise. The typists' room should be as near as may be to the filing room, particularly where a "typists' pool" exists. This pooling of a firm's typists, with a responsible person in charge, is often preferable to the system of each departmental head having his own typist, because the work may be evenly distributed amongst the whole of the typing staff.

Staff. Generally, the office staff is divided into departments, each department being made responsible for its own work, discipline, etc.; and if it is large enough, a department may be sectionized, or even divided again into sub-sections. There will be departmental heads or managers, and each manager will be responsible to the board of directors or other governing committee or to the head of the firm, through the managing director, secretary, or other chief official. The actual division into departments can be determined only by reference to the requirements of the business of any particular body or firm. It is essential that there should be no overlapping, and the duties of departments,

sections, etc., down to each individual member of the staff should be clearly defined. Each unit should be responsible to that above, and to that one only, and a member of one department should not interfere with a member of another department except through the head of that department. Highly skilled employees should not perform duties that could be performed properly by a subordinate, and the labour should be so divided that everything can be conducted expeditiously, and so that each official bears a fair share of the burden. The duties, especially in the cashier's and accounts departments, should be so arranged that one member acts as a check upon the work done by others, to minimize the risk of fraud. It is a great mistake to have "watertight" compartments in an ordinary business office. Secrecy as to an official's duties is never good policy, and the chief members of a staff should all have understudies, who know sufficient of what is going on to be able to step into their superior officers' places whenever necessary.

Some record should be kept of each employee on the staff, and cards showing name, address, date of birth, special qualifications, position, salary, and other information are suggested for the purpose.

Equipment. The furniture and equipment of an office have undergone considerable changes within recent years, the cumbersome desks and cupboards, heavy high stools, etc., giving place to light-weight steel furniture in an up-to-date office. When furnishing an office, the work to be performed therein should be kept constantly in mind. Elaborate designs are out of place, except perhaps in special rooms where the furniture may be said to have a certain advertising value. In the ordinary office, the value of the work to be performed therein must be a deciding factor in buying furniture, but attention should be paid to modern types designed to reduce noise, dust, and other disturbing elements. The equipment of an office has greatly increased in variety with the study of office methods. An office to-day—in addition, of course, to typewriters, with their various attachments—may use such appliances as these: machines for addressing, cheque writing and cheque protection, tabulating and accounting, calculating and billing, dictating machines, time recorders, internal telephones, postage meter and stamping machines, loose-leaf devices, machines for such routine matters as opening letters, sealing envelopes, folding papers, numbering, etc. In considering the introduction of such labour-saving devices, the question is whether the cost of installing and working is justified by the amount of work

and the results obtained. Machines that will suit one class of work may be useless for another. The organizer's problem is to choose those methods and those machines that will give the most efficient service for his particular business, compatible with the size and profit-capacity of that business.

General Organization. Into the details of organization it is impossible to enter here. The office manager should keep in close touch with every part of the business machine; he should arrange to have daily or weekly reports from the heads of departments as to the work done and to be done, etc. Staff conferences, at which the heads of departments can discuss their problems, are also valuable. Each member of the staff should not only have his sphere of duty exactly prescribed him, but have sufficient scope left for initiative. It is a wise plan to invite suggestions from the staff for the better performance of the work. Many firms make awards for suggestions adopted.

OFFICIAL SECRETS ACTS. These Acts, passed one in 1911 and another in 1920, make it an offence if anyone "for any purpose prejudicial to the safety or interests of the State" commits certain acts which may be generally described as espionage. The acts specified are (a) approaching any "prohibited place," i.e. any place set apart for military purposes, (b) making any sketch, plan, model or note which might be useful to an enemy, or (c) obtaining or communicating any such sketch, etc., or any secret official code or password. By the 1920 Act a number of other actions were added to this list, e.g. (a) wearing a uniform without lawful authority, (b) making any false statement for the purpose of gaining admission to a prohibited place, (c) forging or tampering with any passport or other official document of that kind. It is also an offence for anyone, knowing that a person is guilty of an offence under these Acts, not to disclose the fact to the police. No prosecution under these Acts can be instituted without the consent of the Attorney-General.

OFFSET PRINTING. A process which consists in printing first upon a sheet of rubber, wrapped round a rotating cylinder, and then transferring this inky impression from the rubber to the paper by pressure.

The advantages of the offset process lie in the fact that the elastic rubber will transfer the impression to a rough surface as easily as to a smooth one, thus making it possible to print on rough papers, tin, celluloid, and other substances which cannot be printed upon satisfactorily by other methods.

All ordinary offset printing is done from lithographic plates (see LITHOGRAPHY). But

there are also various methods of printing by the offset process from ordinary type and cuts, from gelatin surfaces, and even from intaglio plates (that is, plates in which the ink is carried in incisions instead of on raised areas).

Offset lithography is done on a press consisting of three cylinders. Round one of these is wrapped the lithographic plate, a sheet of aluminium or zinc scarcely thicker than heavy paper. Against this presses another cylinder, covered by a rubber blanket, and against this, in turn, presses the third cylinder, which squeezes the paper against the blanket and which is equipped with steel fingers, called grippers, to hold the sheet in position while it passes between the cylinders. Presses normally operate at high speeds, 4000 impressions per hour being not uncommon.

Offset was originally developed as a method of printing tin sheets (for making decorated tins, boxes, etc.), but has more recently been applied to almost every class of printing, from the cheapest to the most expensive. Among its more recent applications we find its use in newspaper production, its combination with rotogravure to give coloured reproductions of great delicacy and depth, and its employment for facsimile reproduction of old books, accomplished by photographing the pages of the book to be reproduced, and preparing the lithographic plate directly from the negatives by photographic methods.

OG. A King of Bashan, mentioned in Deuteronomy iii. 11, as one of "the remnant of giants." He had an extensive kingdom with sixty fenced cities. His famous "bedstead" (probably a sarcophagus of black basalt) was more than 15 ft. long and nearly 7 ft. wide. Many legends have arisen about him. According to one story, he plucked up a mountain to hurl at the Israelites, but the feat was too much for him. Moses, when Og was "delivered into his hand," was able to kill him. See Gog and Magog.

OGHAM. A language which dates possibly from the fifth century and was found only in some parts of the British Isles, and more especially in Ireland, Scotland, Wales, and South-West England. Ogham probably means "the skilled use of words." Something like three hundred Ogham inscriptions have been found, most of them in Ireland; they are nearly all epitaphs. The letters were cut in stone or wood and were formed by straight or slanting strokes cut above, under, or through horizontal lines. Some scholars are of the opinion that the letters are a debased form of Latin.

O.G.P.U. (now known as the NARKOMV-MODEL). The Soviet secret police, formerly

called the *Cheka*, designed to suppress enemies of the Revolution as well as lawlessness in general. The executive head is the Chairman, a member of the Council of People's Commissaries, and legal control is exercised by the Attorney-General of the Union, acting under decrees of the Central Executive Committee.

O. HENRY. See PORTER, W. S.

OHIO, o hi' o. One of the north-central states of the American Union. The name is a contraction from the Iroquois-Indian word *Ohionhio*, meaning "beautiful river."

Ohio has an area of 41,040 sq. miles and a population (1930) of 6,646,697.

There are many cities and towns with over 50,000 inhabitants. Chief among them are Columbus, the capital (population, 290,564), Cleveland, the most populous, Cincinnati, Toledo, Akron, Dayton, Youngstown, Canton, Pakewood, and Springfield.

Physical Features. The eastern part of the state is level, and most of the western half belongs to the prairie region. In general, the surface is an extensive and moderately undulating plain about 850 ft. above the sea. There are many hills; the highest point is Hogues Hill near Bellefontaine, a little west of the centre of the state, with an altitude of 1550 ft.

The rivers of the state flow either north into Lake Erie or south into the Ohio River. Severe floods have not infrequently occurred.

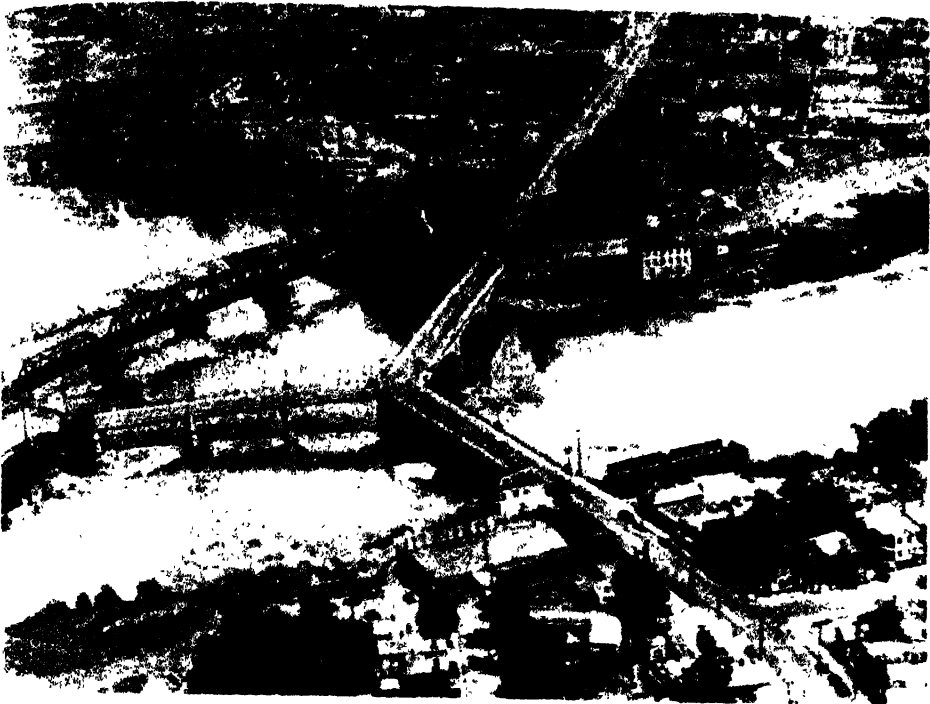
The Ohio canal joins Cleveland on Lake Erie and the Ohio river, via Columbus.

Climate. Ohio has a continental type of climate, with great extremes of temperature. Lake Erie exercises a moderating influence in the counties along its shores. The average temperature for the year is about 51° Fahrenheit. The rainfall averages 38.5 in. annually.

Agriculture and Resources. Eighty-five per cent of the land area is included in farms, and of this amount about four-fifths is improved land. The products of the state are varied, but the chief crops are maize, hay, oats, wheat and potatoes.

Market gardening is largely carried on in the vicinity of the industrial towns. Tobacco is cultivated in the south-western, and sugar-beet in the north-western counties. The state is a large producer of fruit, especially of apples, peaches, and grapes.

The south-eastern corner of the state, where the hills are often barren and always hard to till, affords excellent grazing for sheep. The best pasture land is in the north-eastern corner, and there dairy-farming has become an important industry. 70 per cent of the cattle of Ohio being classed as dairy cattle. Poultry-farming ranks next in importance to dairying.



BRIDGE AT ZANESVILLE, OHIO

Photo: U. & U.

The chief minerals are coal, petroleum, natural gas, clay and salt. Excellent building stone is quarried in many parts of the State. Ohio has great natural resources, an abundance of raw material and fuel, and excellent water and railway transport.

Manufactures. The leading industry of Ohio is the manufacture of iron and steel. The iron ore is brought by water from the Lake Superior iron region, while a great amount of the coke necessary in the manufacture of iron and steel is brought from Pennsylvania. Great amounts of pig iron are produced yearly. Allied to the iron and steel industry is the manufacture of foundry and machine-shop products, the fourth most important industry, and of motor-car bodies and parts. The main centres of the iron and steel manufactures are Cleveland and Youngstown.

Slaughtering and meat-packing is another important industry, its chief centres being Cincinnati and Cleveland.

The latter city (population in 1930, 990,429), in the variety and extent of its manufactures, sums up the economic activities of this markedly industrial state. Not only is Cleveland the world's greatest ore market, but it has numerous foundries, mills and furnaces, as well as a vast assemblage

of plant for turning out finished products in iron and steel—from nuts, bolts, and nails (in the output of which it is unsurpassed) to motor-cars, boilers, telescopes and ships. In addition, it has oil refineries, clothing factories, grain elevators and flour mills, and is America's chief market for fresh fish. The frontage on Lake Erie extends to 14 miles, with large harbours and docks and equipment for shipbuilding and lumbering.

Government. Ohio is governed under a constitution adopted in 1852. This constitution has been amended several times, the last being in 1912.

Five executive officers—the Governor, Lieutenant-Governor, Secretary of State, Treasurer, and Attorney-General—are elected for two years, and the Auditor is chosen for four years.

The legislative power is vested in a Senate of thirty-five members and a house of representatives of 130 members.

At the head of the Judicial Department is the Supreme Court, with seven judges. The state is divided into appellate districts, and in each of these there is a court of appeals. Each county has a Court of Common Pleas.

OHM, *ohm*. A standard unit for measuring electrical resistance. As defined by the

Electrical Congress held in Chicago in August 1893, and adopted in all English-speaking countries, the international ohm is the amount of resistance to a uniform electric current offered by a thread of mercury having a cross-sectional area of one square millimetre and a length of 106.3 centimetres, at a temperature of 0° Centigrade. Since a column of mercury is not a convenient device for practical use, it is customary to employ high-resistance metal wires in ordinary measurements. The *microhm* is one-millionth of an ohm, the *megohm* one million ohms.

Georg Simon Ohm (1787-1854) was born in Erlangen, Bavaria. From 1817 until his death, he was successively professor of physics in the Jesuit college at Cologne, director of the Polytechnic School in Nuremberg, and professor of physics in the University of Munich. For his discovery of the law known by his name he received the Copley medal from the Royal Society of London.

Ohm's Law. Experiment proves that if the resistance remains the same, the flow of an electric current will increase in proportion to the increase of the electromotive force. Professor Georg Simon Ohm, the German physicist who discovered this law, stated it as follows: *Current equals volts divided by ohms*. In other words, the intensity of the current equals the electromotive force divided by the resistance.

See **ELECTRICITY**.

OIL-CAKE. The residue of oleaginous seeds, obtained by crushing or pressing. Agriculturists, at first regarding it as of little value, applied it to land for manure but oil-cake is now recognized to have high value, and is one of the main foods for cattle. Oil-cake is made from linseed, cotton, sunflower, palm nut, etc., the linseed and cotton being principally used for cattle-feeding. The least valuable are used for manural purposes. Linseed cake consists almost entirely of flesh-forming and fat-producing materials.

OILCLOTH. A heavy cloth, sometimes called floorcloth, used commonly to cover surfaces that require frequent washing. Its foundation is a strong, coarse hemp canvas, which is stretched in a frame, brushed with a glue-size made of glue, rye, flour, and varnish, then dried and rubbed with pumice stone. Two or three coats of thick, heavy paint are then applied, and each coat, when dry, is smoothed with pumice stone. After this process, the cloth is placed in a frame where the pattern is printed by blocks, as in calico printing, each colour having a separate block.

Floor oilcloth has largely been superseded by linoleum, as the mixture of ground cork and oxidized linseed oil in the latter

makes it more durable. Lighter weights of oilcloth are used for tables, pantry shelves, and various other household purposes. See **LINOLEUM**.

OIL ENGINE. See **DIESEL ENGINE**; **PETROL ENGINES**.

OIL PAINTING. Painting in oils entails the use of pigments ground in oil and—to give a proper consistency and drying qualities—mixed with a medium such as turpentine, linseed oil, or varnish; the painting being done on a prepared canvas or wood panel. Up to the early fifteenth century, oils and varnishes were in use for covering paintings in tempera (which see), and transparent oil colours were also painted over thick tempera or a primed surface. With the advent of the two Flemish painters, Hubert and Jan van Eyck, about 1420, oil painting in its more modern sense came into being. These two brothers perfected the process of mixing pigments with oleo-resinous vehicles, producing a hitherto unobtainable ease of working and a new richness of colour with a more extended use of opaque pigments, especially in the high lights. From Flanders the new art spread to Italy and was taken up by the Florentine School, as represented by Verrocchio, Perugino and Leonardo da Vinci. The Venetian painters also found in it a new means of expressing the richness and varying tones of colour, as seen in the works of Titian, Bellini, Tintoretto and Veronese. In France, among the earlier masters of the art were Watteau, Chardin and Boucher, while in the Netherlands, oil painting reached a high state of artistic skill and technique in the work of Rubens, Rembrandt, Hals, Steen and others. In England the art, at first under continental influence, rose to prominence in the eighteenth century under Hogarth, Reynolds and Gainsborough. See **PAINTING**.

OILS. A class of substances composed chiefly of hydrogen and carbon (in complicated arrangements of the atoms) and which, in a liquid state, flow slowly and adhere to most substances with which they come in contact. Oils are lighter than water, and will not mix with or dissolve in it. According to the sources from which they are obtained, oils are classified as *animal*, *vegetable*, and *mineral*; according to their behaviour on heating, they are classified as *fixed* (or *fatty*) and *volatile*. Fatty oils are soluble in benzene, ether, chloroform, etc., and slightly in alcohol.

Fixed oils are of both animal and vegetable origin. Those obtained from animal tissue are extracted by pressing the tissue when cold, or by heat and pressure. Since a much larger quantity of oil is obtained by the use of heat, this method is usually employed.

Among the most valuable fixed oils are those obtained from certain kinds of fish, as salmon, sardine, herring, menhaden, and sturgeon. These are sometimes known as *marine*, or *fish*, oils. The seeds of certain plants are also important sources of fixed oils. Chief among them are flax-seed, from which linseed oil is obtained; cotton-seed, corn, and sesame.

Drying oils are those that absorb oxygen when exposed to the air, and form an elastic solid substance when spread in thin coats. These oils are extensively used in making paints, the most important among them being linseed, hemp, walnut, poppy, sesame, sunflower, and Chinese wood oils. *Non-drying oils*, on exposure to the air, ferment and become rancid. Olive, cotton-seed, and almond oils are examples. *Semi-drying oils* absorb oxygen from the air rapidly, but do not harden. Oil-soaked rags sometimes absorb oxygen so rapidly that they take fire from the heat developed by the chemical action. Cotton- and grape-seed oils are good examples of semi-drying oils. Fixed oils are heavier than water and will not dissolve in it. They dissolve readily in alcohol and ether, and those used in paints dissolve in turpentine.

Fixed oils are used for many purposes. Coconut and coconut oil are valuable as lubricants. Other oils have their uses in medicine, tanning, dressing leather, making paints, lubricating machinery, and for illumination. See LANSLED OIL, PETROLEUM.

Volatile oils are those that evaporate readily on exposure to the air. They are obtained from plants, and are usually extracted by distilling the plant or some part of it with water. The more delicate oils, like the clove oil, are often obtained by packing the flowers in such a fat as lard, which dissolves the oil. The fat is then heated and the oil separated from it by distillation. When dissolved in alcohol, volatile oils form *essences*. They are extensively used in the manufacture of perfumery, and some of them, as peppermint, clove, and wintergreen, are valuable in medicine. The oils of clove, rosemary, cinnamon, lemon, lime, orange, and nutmeg are used in the arts. See PERFUMES.

OIL WELLS. See PETROLEUM.

OKAPI, o kay' pe. A peculiarly coloured animal of the giraffe family, discovered in 1899 by exploring parties in the dense forests of the Congo region of Africa. It is about 4 ft. tall at the shoulders, and has a rather long neck, while its sloping body makes the forelegs look longer than the hind ones, as is true of the giraffe. Although the body is reddish-brown, the limbs are a creamy-white colour, boldly marked with purple-black stripes and blotches. The face is creamy

white, but the nose and pointed ears are deep-brown or black. In 1935 a specimen



OKAPI
Photo U. & L.

lived for some months in the Zoological Gardens, London.

Scientific Names. Okapis belong to the family *Cervidae*. The botanical name is *Okapia johnstoni*.

OKHOTSK, o khot'sk. See OCHOTSK. A large inlet of the North Pacific Ocean, 1000 miles long and 600 miles wide, navigated chiefly by whaling vessels. It is separated from Bering Sea on the east by the peninsula of Kamchatka and from the ocean on the south by the Kurile Islands. This sea is icebound from November to April, and is subject to heavy fogs and storms.

OKLAHOMA, o klah' ma. A western, south-central state of the American Union, formed in 1907. It has an area of 70,057 sq. miles, of which 643 sq. miles are water surface, and a population (1930) of 2,396,040, including over 120,000 Indians. The most important cities are Oklahoma City, the capital (population, 185,389), Tulsa (141,258), Muskogee (32,026), Enid, Shawnee and Okmulgee.

Physical Features. Oklahoma is a vast, elevated plain, tilted toward the south and south-east and broken by low mountains. The Ozarks of south western Missouri extend into the north east section of the state and form a wooded tableland, carved by the deep valleys of streams, but having no high peaks. Along the eastern border, long,



THE "DEVIL'S PARASOL"

The great hill, weathered into its strange shape, is in the north-east of Oklahoma. It is of granite from the zinc and lead mines of the district.

Photo: Keystone

narrow, heavily timbered ridges rise from the prairies, culminating in the south east in the low, rugged Ouachita Mountains. The Wichita Mountains, a straggling range of rough granite peaks, rise abruptly from the seemingly level plain in the south-western part of the state.

The Panhandle is a high, rough tableland, extending nearly to the foot of the Rocky Mountains. Oklahoma here reaches its highest elevation, from 3000 to 4700 ft. above sea level. The lowest part of the state is in the Red River Valley, which is a gently rolling timber and agricultural region, 300 to 600 ft. above the sea.

Oklahoma is crossed by nine rivers and numerous smaller streams, but none is of value for navigation. The Red River forms the entire southern boundary, and with its tributaries, the Kiamichi, Ouachita, and North Fork of the Red, drains all the southern portion of the state. The Arkansas, crossing the north eastern part of the state, is the main waterway.

Agriculture and Industries. The prairies furnish excellent cattle pasturage. The high plains of the west are particularly adapted to grazing, but in the mountains of the south-east also the livestock industry flourishes.

In the middle and eastern districts, the soil is very fertile, and large crops of wheat, cotton, and maize are grown. In the north-central and western districts are found the wheat fields. The fertile valleys of the centre

and east are maize lands. Cotton, with the greatest acreage, is grown in the south. Two-thirds of the state. Potatoes, two-thirds of which may be grown on the same ground in a year, hay and forage, sweet potatoes, and other vegetables, tobacco and flax are also important.

Of minerals petroleum is the chief product. Natural gas is found in and near the oilfields. Coal ranks third in importance, zinc, lead, granite, clay, copper, iron and gold are also found.

Among manufactures, first in importance is milling, this is followed by refining of oil, meat-packing, the manufacture of cotton seed oil and cake, lumber and timber products, and sand and clay products.

Government. The legislature, which meets biennially, consists of a Senate of not more than forty-four members, and a House of Representatives of members.

The executive power is vested in the Governor, Lieutenant-Governor, Secretary of State, Attorney General, Treasurer, Superintendent of Public Instruction, Commissioners of Labour, Charities and Corrections and Insurance, Mine Inspector, and State Examiner, all of whom are elected for terms of four years.

The judicial department consists of a Supreme Court, District, County, and Municipal Courts, and Justices of the Peace. The Supreme Court consists of a Chief Justice and eight judges, elected for six years.

OLAF. The name of two kings of Norway. **Olaf I** (969-1000). Olaf Tryggvesson spent much of his youth as an exile in Russia. From 991 to 994 he harried England. He was accepted as King of Norway in 995. A Christian, he converted his subjects, partly by force. He was killed in a sea-fight off Rügen, fighting against the Danes and the Swedes.

Olaf II (995-1030). Olaf Haraldsson, sometimes called Olaf the Fat, became King in 1016. He resolutely set out to break the power of his turbulent Earls and succeeded in subduing many of the most dangerous. He enforced Christianity with the sword as well as by more orthodox methods. Both these activities made him unpopular, for his subjects were fiercely independent, and the "White Christ" seemed to them a feeble figure in comparison to their old rough gods. Saint Olaf, as he became after his death, was killed at Stiklestad in battle with rebellious nobles, having already fought hard to keep his kingdom from annexation by the Dane Canute. In the following century he was proclaimed patron saint of Norway. See NORWAY (History).

OLD-AGE PENSIONS. Regular payments to assist men and women of advanced age, in order that they may not be wholly dependent upon relatives or upon charity, or pass their declining years in almshouses or poor-law institutions. The plan exists in a number of countries and in many forms.

It is claimed for the old age pension that it gives greater national efficiency by relieving the younger generation of the need of supporting their parents, and preserves the spirit of independence in the aged.

Nearly every nation grants pensions to Government employees in their old age. In a few countries this principle is extended to all citizens. Denmark, the pioneer in 1891 of non-contributory pensions, has a scale which varies according to the place of residence and whether a claimant is single or married. Non-contributory pensions are found also in the United Kingdom, France, Belgium, U.S.A., Australia, New Zealand, Canada, South Africa, and the Irish Free State, but with the exception of the U.S.A., there is a movement toward contributory schemes in these "free pension" countries.

No non-contributory pension is granted if the claimant has adequate means, and usually he has to have been a national of the country for a long period. In those schemes where the worker contributes to his old-age pension, no inquiries are made as to means, as the contributions paid entitle him to his pension.

Germany was the first country to adopt a contributory pensions scheme, when, in 1891,

manual workers were compelled to insure, a pension being granted at the age of 70. After 1911, salaried workers were forced to insure on a similar basis. Contributory pensions schemes are now in operation also in Great Britain, France, Belgium, Spain, Austria, Italy, Holland, Russia, Czechoslovakia, Poland and Hungary.

Pensions in Britain. Old-age pensions were introduced into the United Kingdom by the Old Age Pensions Act, 1908. Any property, real or personal, of the claimant is calculated as equivalent to an annual income when the means are being investigated. In 1920, blind persons were allowed pensions at age 50, instead of 70.

Contributory old-age pensions are now much more important in Britain. The comprehensive Widows', Orphans' and Old Age Contributory Pensions Act, 1925, provides for the compulsory insurance of all workers liable for National Health Insurance, one combined contribution being paid for Health and Pensions Insurance. The employer, too, pays his share. A feature of the contributory system in Britain is that the amounts of the pension and contributions are fixed, the remuneration of the employment being ignored, while in most continental systems the insured's contributions and pensions vary according to the wages earned.

OLD BAILEY. The name of a street in the City of London, also commonly given to the Central Criminal Court (which see).

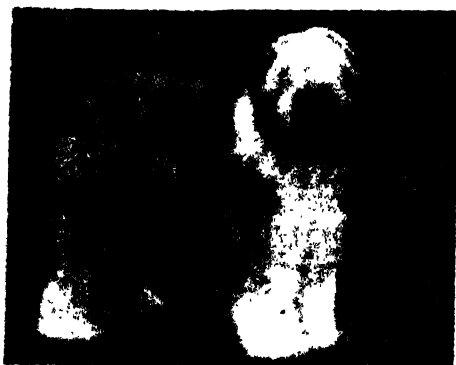
OLDCASTLE. SIR JOHN (d. 1471). Lord Cobham, as he was also styled, having married the heiress of the Barony of Cobham, was a personal friend of Henry of Monmouth, whom he served on the Welsh Marches. He became a Lollard and was condemned as a heretic by an ecclesiastical court. He escaped from the Tower, but failed in his plot to seize his former friend, now King Henry V., a rising planned in 1415 also failed. He was arrested in 1417 and burnt at the stake as a heretic and traitor. His memory was ridiculed until the Reformation, and he appears to have been a stock figure of comedy. Sir John Falstaff probably was first called "Sir John Oldcastle" by Shakespeare, in deference to Protestant feeling, changed the name, and apologized in the epilogue to *Henry IV., Part I*. For Oldcastle died a martyr, and this is not the man.

OLDENBURG. A former republic, within the republic of Germany. Before the World War, it was a grand duchy of the German Empire, but it became a republic in 1918. In 1934 all special privileges were abolished. As now constituted, it consists of the three provinces of Oldenburg, Lubeck and Birkenfeld, having a total area of 2480 sq. miles and population (1933) of 574,471.

Oldenburg province, which embraces four-fifths of the area and population, is a part of the plain of north-western Germany lying between the Weser and the Ems. It consists of low, marshy coast lands along the North Sea, and an inland sandy region with extensive heaths and moors. The soil of the marsh lands produces wheat, oats, rye, hemp and rape, and it also gives pasturage for cattle and horses. On the inland soil, crops of rye, oats, potatoes and buckwheat are raised, and large numbers of sheep graze upon the moors. The chief articles of manufacture are woollen and cotton goods, hosiery, jute and cigars. The capital city, Oldenburg, has a population (1933) of 66,951.

OLDENBURG, HOUSE OF. Former royal family of Denmark. See DENMARK (History).

OLD ENGLISH SHEEPDOG (sometimes called the Bobtail or Smithfield). A thick-set, muscular, able-bodied dog, with a profuse, shaggy coat quite free from curl, of



OLD ENGLISH SHEEPDOG
Photo. Felli

any shade of grey, grizzle, blue or blue merle, with or without white markings, or in reverse. Many blue dogs are black at birth, and the date of changing colour varies—nothing can be done to influence the colour.

Grooming is very important. A pair of good stiff dandy brushes should be used regularly every day, and the comb as seldom as possible. To obtain the desirable "stand off" appearance, the coat is brushed in the reverse direction, from rump to head. One must be careful not to say "from tail to head," for many dogs are born without tails, and if a puppy has a tail it must be amputated at once.

The Old English Sheepdog is an efficient working sheepdog and retriever, excellent housedog and guard, wonderful with children, remarkably intelligent, and of a happy disposition. In spite of his heavy appearance, he is very active and elastic in gallop, but

in walking has a characteristic bear-like gait. The forelegs should be perfectly straight, nose black and large, and dark eyes are preferred. The height of dogs is about 22 in. at the shoulder, and of bitches rather less.

OLDHAM. County Borough and industrial centre of Lancashire, with an area of 4735 acres and a population of 140,314 in 1931, seven miles north-east of Manchester, and served by the L.M.S. and L.N.E. Railways. From the seventeenth century the town has been a noted centre of the textile industry. To-day it is still one of the principal cotton-spinning towns in the world. In addition, there are many factories producing cloth and cotton goods. Heavy engineering ranks second in importance among the town's industrial activities, and it has a larger output of textile machinery than any other town in England. Heating and ventilating machinery, and cranes are also produced. Minor industries include the manufacture of brushes, leather goods and electric motors.

Although principally of modern growth and retaining few historic monuments, Oldham existed as a flourishing manor from the early Middle Ages. The year 1630 is given as the date of the foundation of the textile industry, and by the end of the eighteenth century the population had swollen to about 10,000. The Borough was incorporated in 1849. Of the public buildings, none is of unusual interest, but the parish church of St. Mary, which was dedicated in 1850, is notable.

OLDHAM, JOHN (1653-1683). Satirist. Oldham was a bitter and uncompromising critic of contemporary manners and beliefs. In the polished and flippant age of Charles II his vigorous and independent satire has an impressive tone of sincerity. Before dying of smallpox in his thirty-first year he had made his mark with a *Satire upon the Jesuits*, an ironical *Satire against Virtue*, and several other poems.

OLD RED SANDSTONE. An extensive group of stratified rocks of Devonian age, consisting largely of red sandstone, found typically in Scotland, and appearing also in various parts of north-western Europe, including Spitzbergen. In some districts, the group is 16,000 to 20,000 ft. thick, and contains fossils of great interest to geologists. In the sandstone of Central Scotland occur lava ranges like the Pentlands and Ochils, the product of volcanic forces. See GEOLOGY.

OLD TESTAMENT. See BIBLE.

OLEANDER, o le an' der. A flowering shrub native to tropical and sub-tropical Asia and the Mediterranean region. The oleander is planted in the open in warm

climates, but is usually grown in pots and tubs in temperate regions. It is a handsome shrub, sometimes growing 15 ft. tall and bearing leathery lance-shaped leaves and showy rose-like flowers. The two varieties most commonly seen have red and white blossoms. It is easily grown from cuttings, which, if placed in water, will form roots in a few weeks. The juice of the plant is poisonous.

Scientific Name. The oleander belongs to the dogbane family, *Apocynaceae*. Its botanical name is *Nerium oleander*.

OLEIN, o' le in. See LARD.

OLIGARCHY, ol' e gar ke. A form of government in which the ruling power is vested in a few persons. The word originated in ancient Greece, where most of the cities had this form of government between the time of the patriarchal kings of the *Odyssey* and *Iliad* and the rise of the tyrants. Oligarchy is the opposite of a pure democracy, where all citizens have a direct share in the government, and differs also from a republican form of government, in which the people elect officers to represent them in the conduct of the nation.

Those who favour oligarchical rule believe that it works for the best interests of the state and a selected group of the most enlightened citizens control affairs. An example of oligarchical rule is the government established in England by Oliver Cromwell. Most oligarchies, however, favour the interest of their own group. See ARISTOCRACY, GOVERNMENT.

OLIGOCENE, ol' ig o seen, EPOCH. The second of the epochs comprised in the Tertiary Period, succeeding the Eocene and succeeded by the Miocene Epoch. Some geologists rank the Oligocene as a period.

Although they are less widely distributed than the Eocene strata, Oligocene rocks are

found in many parts of the world and contain abundant fossils. The epoch was characterized by great changes in the distribution of land and sea, and by the appearance of more modern forms of mammalian life. In the Isle of Wight and Hampshire, Oligocene sands, clays and limestones contain mainly a freshwater or brackish fauna. The rocks were deposited in a great lake which was sometimes broken into by the sea. At such times, deposits were formed containing remains of a marine fauna. See GEOLOGY.

OLIVE. One of the oldest cultivated tree fruits. Native to the Mediterranean regions of Western Asia and possibly to Greece and



OLIVES
Photo U. & U.

neighbouring islands, the olive tree is now grown in many different countries. Olives are among the important products of Italy, France and Spain, and are grown in North Africa, Australia and South America.

The olive tree is a hardy, long-lived plant, bearing fruit for centuries. In southern lands there are groves with trees 20 ft. in circumference, giving evidence of being a thousand years old. Olive trees are low-branched, and usually do not grow taller than 30 ft. The lance-shaped leaves are dusky green above and whitish beneath, and are evergreen. The flowers, of yellowish-white colour, are fragrant. The fruits vary in size from an acorn to a plum, are oval in shape, and contain a hard, two-celled stone. When ripe, the fruit is black. Unripe fruits have a characteristic green colour. Olive trees do not come into profitable bearing until the seventh year, and into full bearing until about thirty years of age. Then they bear plentifully, year after year.

Over half of the olive crop is used for making oil, the properties and uses of which are described in the following article. The fruit itself is too bitter to be palatable to



FRESH WATER AND MARINE FOSSILS
From the Oligocene of Headon Hill, I.O.W.
Photo: H. E. Taylor

most people when plucked from the tree, and is ordinarily pickled for table purposes, either green or ripe. In Greece, however, dried ripe olives are eaten. Both the green and ripe olives contain over 25 per cent of fat, and both have considerable amounts of lime and other minerals.

The olive leaf is mentioned in Genesis viii. 11, as the sprig brought back to the Ark by Noah's dove. Among the ancient Greeks, the olive was sacred to Pallas Athene, and a crown of olives was the highest reward of victors in the Olympic Games. Both Greeks and Romans were accustomed to anoint their bodies with olive oil. From the traditional conception of the olive as a symbol of peace has come the expression "to bear the olive branch."

Scientific Names. The cultivated olive belongs to the family *Oleaceae*. Its botanical name is *Olea europaea*.

OLIVE OIL. A clear, odourless oil, of pale-green or golden-yellow colour, used throughout the world as food, as medicine, and in the arts and manufactures. It is extracted from the fruit of the olive tree, and the methods used everywhere are more or less the same. The fruit is crushed into pulp, then put under pressure, and the extracted oil is caught in tubs half filled with water. All impurities sink to the bottom, and the oil taken from the top, when filtered, clarified and bottled, is a pale-green fluid, the best quality olive oil. Further pressure of pulp produces inferior qualities.

Olive oil is one of the most popular ingredients of salad dressings. It is also used in place of butter in cooking, and has the desirable quality of burning only at a high temperature. In medicine it is used as a mild laxative. It has the high fuel value of 4080 calories per lb. (see **CALORIE**), and is often prescribed as a fattening food for poorly nourished people. It is also used in preparing liniments, ointments and plasters, in the manufacture of soaps, and to preserve the wood of cricket bats, etc.

OLIVES, MOUNT OF, OR MOUNT OLIVET.

A low and short mountain range east of Jerusalem, separated from it by the Valley of Jehoshaphat and the Brook Kedron. To Christians, this mountain is sacred because of its association with the last days of Jesus. See **JERUSALEM**; **JESUS CHRIST**.

OLYMPIA. A valley about 11 miles from Pyrgos, Southern Greece, and famous for the Olympic Games held there in ancient times. It is situated in the Elis district, at the point where the Cladeus flows into the Alpheus. Religion, politics and athletics centred on Olympia, and made it important in Greek history. A temple of Hera, erected about 1000 B.C., made it the centre of an

amphictyony, or league of tribes to protect the temple, and Olympia had the same religious importance for the surrounding states that Delphi held for so long in northern Greece.

All the buildings at Olympia were for worship or for games. The *Altis*, or sacred precinct of Zeus, was an enclosure in the shape of an irregular quadrangle about 21 yds. wide and 275 yds. long. Within the *Altis* were the temples of Zeus and Hera, as well as the Pelopion, the Philippeion and the great altars. Besides these sacred buildings there were statues of victors and votive offerings.

Beautiful examples of Greek art were in these temples, including the magnificent statue of Zeus by Phidias. Just outside the *Altis* were the buildings for contests. Near its north-west corner was a gymnasium where competitors were examined and given the final training. Adjoining the gymnasium on the south lay the *Palaestra*, a wrestling and boxing school. The hill of Kronos was on the north; also, the *Prytaneion*. On the east stood the stadium. The *Hippodrome*, where chariot and horse races were held, was south-east of the stadium.

Olympia declined after the games were prohibited in A.D. 304. A fort was built on the side of the *Altis*, the temple of Zeus being used for the north-west corner, and other buildings to make the wall. Subsequently, earthquakes and floods covered the valley with gravel and soil, until finally the valley was covered by 20 ft. of earth.

In 1829 a French expedition began excavations. The final excavations were made by a German expedition. From 1875 to 1881, the work was carried on to such a degree that the entire *Altis* and many of the surrounding buildings were uncovered. Fragments of sculpture, coins, terra-cottas and bronzes have been found, the most important discovery being that of the *Hermes of Praxiteles*. According to an agreement between the German and Greek Governments, the originals of all discoveries remained in the possession of Greece, but Germany reserved the right to take casts from all sculpture, coins or other discoveries. A museum of Olympian relics has been established in Berlin. See **OLYMPIC GAMES**.

OLYMPIAD, o lim' pi ad. In Greek chronology, the period of four years that elapsed between two successive celebrations of the Olympic Games. This ancient method of computing time came into use about 240 B.C., and all events were dated from 776 B.C., the beginning of the first recorded Olympiad. The first year of the 195th Olympiad corresponds with the first year of Christ, though the beginning of the year of the Olympiad

was determined by the first full moon after the summer solstice, or about the 1st of July. Therefore only the last six months of the first year of the 195th Olympiad corresponded exactly. The years were determined according to the positions of the sun and moon, and had twelve or thirteen months, named variously in the different Greek states, and containing alternately thirty and twenty-nine days. The long year had 384 days and the short 354.

OLYMPIC GAMES. A series of international athletic meetings, celebrated every four years as a revival of perhaps the most important of ancient Greek festivals—the



OLYMPIC GAMES AT AMSTERDAM, 1928
Start of the 100 yards final
Photo Central

athletic contests which were held in at Olympia in southern Greece.

In A.D. 394, the Roman Emperor Theodosius issued a decree forbidding the celebration of the games. In 1896, fifteen centuries later, the finest amateur athletes of the world, representing many nations, assembled at Athens to engage in a series of international contests. It was planned to make this great international meeting the first of a series, to be held every four years at a place decided upon by the international committee. The fifth Olympiad, in 1912, was the first really representative one. The games for 1916 were abandoned, owing to the World War, but the series was continued in its regular sequence in 1920. Winter games were held at Garmisch-Partenkirchen, Bavaria, in February, 1936, and the summer Olympiad on a vast scale in Berlin.

OLYMPUS, o'lim'pus. The highest mountain in Greece; in ancient times regarded as the abode of the gods. It is 9754 ft. high at the eastern end of the ridge which divides Thessaly from Macedonia.

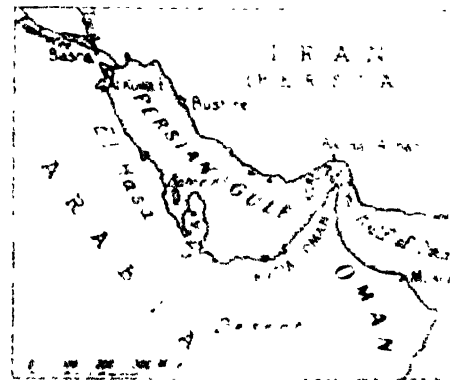
Later, a new and interterrestrial Olympus was created—a wonderful place of brightness above the heavens, and thither the home of the gods was transferred. The change may

be seen in the writings of Homer; the *Iliad* holds to the older creed, and places the gods on the Thessalian mountain peaks, while the *Odyssey* makes their home a sort of heavenly mountain, uncertain in locality, but still called by the name of Olympus.

OM, ohm. A sacred syllable in the Sanskrit language, similar in meaning to the English *Amen*. It was a solemn affirmation or positive assent, and might well be translated, "So it shall be." It was supposed to be uttered at the beginning of every Vedic recitation and again at its close, in order that the understanding of what was spoken should not be lost. Later, the syllable symbolized the union of Vishnu, Brahma and Siva. See **SANSKRIT**.

OMAGH, o'mah. Urban District and county town of Tyrone in Northern Ireland, with a population of 5126, situated at the confluence of the Strule and Drumragh rivers. It is the centre of an agricultural community and, apart from trade carried on in connection with agriculture, there is no staple industry. The most outstanding public buildings are the Court House and the County Hospital, both good examples of modern styles of architecture. As a holiday resort, Omagh is rapidly increasing in popularity, and is a good centre for the Northern Highlands of Ireland. Among several well-known beauty spots in the immediate neighbourhood the most noteworthy are the Gortin Glens.

OMAN. An independent Arab territory known as a Sultanate, in the south-east of the peninsula. It extends along the Persian



Gulf and the Gulf of Oman, and has an area of 82,000 sq. miles. The interior is mountainous and arid, but the north-west coast is fertile and produces dates and limes. The capital is Muscat (population, 4300), a city

now falling into decay. Matrah has a population of 8500. Total population is about 550,000, chiefly Arabs, with some negro blood. The two towns have mainly negroes and Baluchis. A British political agent resides at Muscat.

British Indians control the trade, of which dates are the principal export. There are no manufactures. Transport is by pack animals, but there is one motor road from Muscat to beyond Matrah. See ARABIA.

OMAN, SIR CHARLES WILLIAM CHADWICK (b. 1860). A distinguished English historian; he was born in India. At the age of 23 he became Fellow of All Souls College,



SIR CHARLES OMAN

Oxford, and in 1905 was elected to the Chichele Chair of Modern History. In 1919 he entered Parliament as Conservative member for the University, and held his seat until his retirement at the dissolution of 1935. He has produced important historical works, among which the best known are

A History of Greece (1888), *A Short History of England* (1895), *A History of the Peninsular War* (1902-30), *Napoleonic Studies* (1929), and *The Coinage of England* (1931). For four years (1917-21) he was President of the Royal Historical Society.

OMAR, MOSQUE OF. See JERUSALEM.

OMAR KHAYYAM, o' mar kī yahm' (died about 1123). A Persian poet, astronomer and mathematician, verses from whose poem, "The Rubaiyat," translated by Edward Fitzgerald, are frequently on the lips of English-speaking people. Born at Nishapur, in Khurasan, and educated there, he became royal astronomer, revised the Persian calendar, wrote an extremely important treatise on algebra, and is believed to have discovered the binomial theorem. Fitzgerald's version of "The Rubaiyat" (meaning "collection of quatrains") was first issued in 1859. The love of Nature, regret for the brevity of life, praise of the grape and pleasures of love, and the note of gentle melancholy in these verses have made them widely popular.

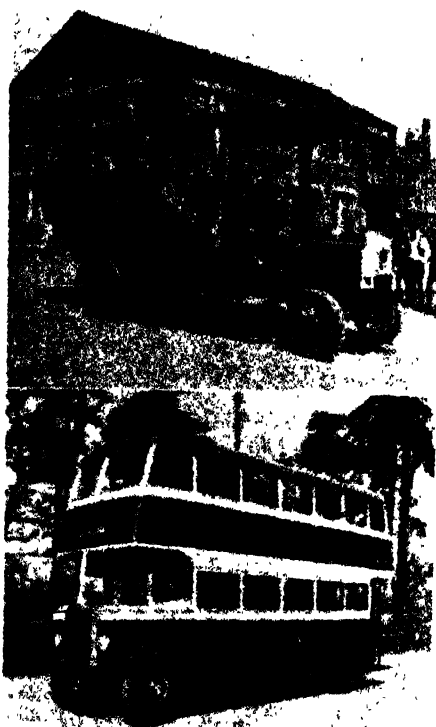
OMDURMAN. See ANGLO-EGYPTIAN SUDAN.

OMEGA, o me' ga. Last letter of the Greek alphabet. See article on letter O.

OMENS. These are signs or occurrences which are supposed to tell of approaching events. In a primitive stage of culture, men

believed that spirits from the unseen world were always about them, manifestations of their influence extending to the ordinary events of life, therefore, if one could read the signs aright, the future could be foretold. This belief survives to the present day among ignorant persons. See DIVINATION.

OMNIBUS. A vehicle licensed to carry passengers on routes laid down by the Ministry of Transport's Traffic Commission.



OMNIBUS

One of the earliest omnibuses (above) and one of the latest type.

Photos: Leyland

ers. Now omnibuses are universally driven by light or heavy oil engines, but formerly they were either driven by steam or were horse-drawn. Omnibuses have to conform generally to regulations laid down by the Ministry of Transport, as well as to local by-laws as to load, length, width, fares, etc. The first omnibuses to appear in London in 1829, were drawn by three horses and carried 22 passengers. The London General Omnibus Company was formed in 1855, and was merged into the London Passenger Transport Board in 1933. The word omnibus generally means to "hold all"; thus an omnibus bill, holding all the relative clauses.

an omnibus resolution, covering all points; an omnibus book, containing all the works of an author, or many works of one kind, etc.

OMPHALE, *om' fa le*. A Lydian queen whom Hercules served.

OMSK. See SIBERIA.

ONEGA, *o ne' ga*, LAKE. Situated in the government of Olonetz, in Northern Russia, this is, next to Ladoga, the largest lake in Europe. It has an area of 3760 sq. miles.

O'NEILL, EUGENE GLADSTONE (born 1888) American dramatist of the modern period, whose plays show a reaction against the realism that portrays merely the external things of life. O'Neill pictures mental conflicts and crises, and his plays show the effects on action and character of spiritual defeat and tragedy.

The best of them are *Beyond the Horizon*, *Emperor Jones*, *Diff'rent*, *Anna Christie*, *The Hairy Ape*, *The Fountain*, *All God's Children Got Wings*, *Desire Under the Elms*, and *Strange Interlude*.

O'NEILL, HUGH. See TYRONE, EARLS OF.

ONION. The widely grown garden vegetable, with strong taste and odour, belonging to the same botanical family as the lily. As a seasoning and as a table vegetable, used

volatile oil which has mildly stimulating properties.

Strassburg, Spanish and Portuguese onions are most popular. Italy, France and, in America, California are noted for the size and mild flavour of their onions, owing to favourable soil and climate.

Onion Culture. Onions may be grown from the tropics to the coldest regions of the temperate zone. Soil is one of the most important items; good loam and a sunny position are necessary, with adequate drainage; freedom from weeds helps production. The soil should be enriched with manure or other fertilizers. Onions may be grown from seed or from sets. Earlier crops, resistant to pests, are produced by autumn sowing.

The chief insect pests of the onion are the onion thrip and the maggot of a small black fly. The thrip sucks the juices of the leaves and causes the plants to wilt and decay. The maggot, hatched on or near the growing plant close to the surface of the ground, burrows its way into the stem below the surface, and kills the plant. Nicotine sulphate is used against the thrips, and corrosive sublimate is employed to check maggots infesting small onion beds. A preventive measure in both cases is to spray with a soft soap and paraffin solution.

The onion is subject also to smut and mildew, and the bulbs are attacked by smudge and neck rot. These may be checked by a lime-sulphur spray.

Scientific Names. The onion belongs to the lily family, *Liliaceae*. Its botanical name is *Allium cepa*.

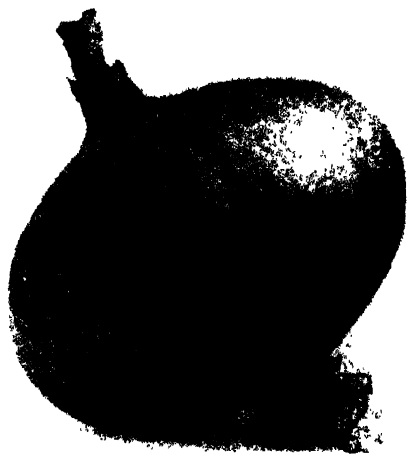
ONOMATOPOEIA. Derived from the Greek *onoma*, word or name, and *poiein*, to make, this term is applied philologically to words that imitate natural sounds, such as bow-wow, cuckoo, peewit, frou-frou, crack, whizz, etc.

Onomatopoeia was formerly considered to be an important influence in the early evolution of a language, but this theory has long been discounted.

ONTARIO. Formerly UPPER CANADA, or CANADA WEST. The most populous province of the Dominion of Canada. With a land area of 368,281 sq. miles and 49,300 sq. miles of water, is the second largest province of Canada, and it is considered the most prosperous.

South of the Albany River is the original province, known as Old Ontario. Its area was 260,862 sq. miles. In 1912 the region lying between the Albany River and the present northern boundary, or New Ontario, was added from the district of Keewatin, the remainder of that district being given to Manitoba.

People. Ontario has a population (1931), excluding 26,436 Indians, of 3,426,488.



PLAT "SPANISH" ONION
Photo: Sutton & Sons

raw or cooked, it has an important place in the larder of the average family.

The edible part is its underground coated bulb. Above ground, the onion is a plant with hollow, tubular leaves, shorter than the flower stalk, which is also hollow and is swollen at the middle. The flowers are small and white, and appear in rounded clusters. The strong odour of onions is due to a

which was about one-third of the entire population of the Dominion. Nine-tenths of the people live in less than one-tenth of the area, the region between the Ottawa River, Lake Huron and Georgian Bay. The Indians live chiefly on the islands in Georgian Bay.

Toronto, the capital, Ottawa, the Federal capital, and Hamilton, an important manufacturing centre, are described in separate articles. Of other towns, London has a population (1931) of 71,148 and Windsor 63,108.

son Bay and the Ottawa River. The bluff, on the north shores of Lake Huron and Lake Superior are a part of this range, which reaches its greatest altitude in the summit of Tip-top Hill (2120 ft.). The second range known as the Niagara escarpment, forms the elevation between Lakes Erie and Ontario, through which the Niagara gorge has been worn. It extends in a north-westerly direction, forming the hills commonly called the Blue Mountains, at the upper end of Lake



GOVERNMENT HOUSE, TORONTO

This is the residence of the Lieutenant-Governor of the Province.

The Methodists, united with the Congregationalists and a majority of the Presbyterians, form the United Church of Canada. The Anglicans (the Church of England in Canada) and the Roman Catholics are next in number, followed by the Baptists and the Presbyterians, known colloquially as the "Continuing Presbyterians."

Surface and Climate. The crystalline rocks of the Laurentian shield underlie most of Ontario, but much is overlain by glacial drift. In general, the surface may be characterized as a low plateau crossed by two ranges of hills, or heights of land. The first of these extends from Kingston in a north-westerly direction, and forms the watershed separating the streams that flow into the Great Lakes from those that flow into Hud-

Ontario, and the tongue of land between Lake Huron and Georgian Bay. The clay belt of Northern Ontario has much fertile land awaiting settlement, but the most productive parts of the province are in the south in the Lake peninsula, and particularly the Niagara peninsula.

The important rivers are the Ottawa, the St. Lawrence and the Niagara. The Ottawa is navigable to Ottawa.

Ontario is dotted with hundreds of lakes. The largest are Simcoe, Nipissing, Nipigon, Muskoka and the Lake of the Woods. Besides its inland waters, Ontario has an extensive water area from the four Great Lakes bordering upon it, and to these must be added Georgian Bay.

Owing to its latitude and the influence of

the Great Lakes, the south-eastern part of Ontario has a mild climate. In the northern part the temperature is lower, and along the high altitudes the winters are severe.

The annual rainfall varies from 30 to 40 in. It is evenly distributed throughout the year.

Trees and Fauna. Hardwood trees, such as the oak, the maple and the hickory, are common. In the north, coniferous trees, such as the spruce and pine, abound.

Caribou, bear, several species of deer, and a few moose and elk constitute the "big game" of north-eastern Ontario. Small ani-

140 miles north of Sudbury, and at Red Lake. Cobalt is the site of the largest silver mines in the Dominion, and probably the centre of one of the richest deposits of silver in the world. Copper is found all along the north shore of Lake Huron; iron is found north of Lake Huron and Lake Superior, and in the Rainy River district west of Lake Superior there are extensive deposits. Petroleum is found in the counties of Lambton and Kent, as well as along Lake Huron, where natural gas also occurs.

Lumbering and Agriculture. The greater



ONTARIO

Looking east over the Winnipeg River, near Minaki.

Photo: Canadian Official News Bureau

mals, valuable for their fur, are still numerous, chief among these are the mink, skunk, weasel, ermine, beaver, otter and musk-rat. The trapper still plies his trade in the great forests and in the sparsely peopled land, and the fur trade is of such value as to demand the attention of the Dominion Government to prevent the extermination of fur-bearing animals. In summer, thousands of song birds are found, and the secluded inland lakes are frequented by wild geese and ducks which come north to nest.

Ontario shares with the United States the fisheries of the Great Lakes, with the exception of Lake Michigan. Trout, whitefish, herring, pickerel and pike are taken in large numbers. Eels, perch, maskinonge (muskelunge) and catfish are also important.

Mineral and Oil Resources. Ontario leads the world in the production of nickel and cobalt, and the Dominion in the output of gold. The chief mineral region lies north of Lakes Huron and Superior. Sudbury is the seat of the nickel mines, and the most important gold mines are around Porcupine, about

part of the best farmland of Ontario was originally covered with forests, and the pioneers had to clear the land. Even now it is estimated that about one-fourth of the area is forest. In the southern part the trees are chiefly hardwoods—oak, maple, walnut, hickory, etc. In the newer part of Ontario are about 60,000,000 acres covered with spruce, jack pine and tamarack. Pulp and paper contribute about two-thirds of the annual value of forest products.

Ontario is next to Quebec in the production of lumber. The chief centres of the industry are the Upper Ottawa River, north of Georgian Bay, and west of Lake Superior, along the Rainy River.

Agriculture is most important, and that part of the province between the Great Lakes and the Ottawa River is one of the most highly developed agricultural regions in North America. The soil is a rich black loam. Hay, oats, wheat, barley, peas and flax are grown. The Lake Peninsula is well adapted for peaches, pears, plums, grapes and small fruits. Apples in large quantities

are grown. Much fruit is exported to England.

Dairying is an important industry, and while there are few farms devoted entirely to dairy cows, no farm is without some dairy stock. Cheese-making is the most important branch, with a yearly production of over 100,000,000 lb. Livestock-raising, particularly of pure-bred stock, has developed.

Industries and Power Development. Ontario remains the leading manufacturing pro-

National and Canadian Pacific, with their branch lines, bring all towns within a few miles of a railway.

The chief railway centres in the south are Ottawa, Toronto, Hamilton, Guelph, London, Owen Sound and Parry Sound. In the north they are Sudbury, Fort William and Port Arthur. The cities and larger towns have electric lines.

The St. Mary's, the Ottawa and the St. Lawrence rivers are the only streams navigable



STOCKYARDS AND PLANT OF MEAT FACTORY AT TORONTO

Photo: Canadian Official News Bureau

vince of the Dominion, having unlimited water power, besides an abundance of raw material and good transport facilities. The motor industry of Canada is centred here. Flour ranks next in value, followed by meat products. Next in order are pulp and paper, rubber goods, and butter and cheese. The most important industrial centres of Ontario are Toronto, Hamilton, Ottawa, Oshawa, Kitchener, London, Niagara Falls, Peterborough, and Windsor.

In 1906 the provincial government secured the power plant at Niagara Falls, which at the time of its completion was the largest plant in the world for generating electrical power; since then State control has been extended to include all important water-power sites.

Communications and Commerce. Ontario has over 10,900 miles of railway, and in the older part of the province the Canadian

able for large boats, but frontage on the Great Lakes gives Ontario unusual facilities for water transport. Port Arthur, Sault Sainte Marie, Collingwood, Parry Sound, Owen Sound, Windsor, Hamilton, Toronto and Kingston are important lake ports. There are a number of canals in the province, the most important being the Sault Sainte Marie, the Welland, the Rideau and the Trent.

Most of the export trade is with the United States, Great Britain and the West Indies. An extensive trade is carried on with Manitoba, Saskatchewan, Alberta and British Columbia. The chief exports are copper, silver, nickel, gold, forest products, especially lumber, wood pulp, railway sleepers, and agricultural produce, including butter, cheese and fruit. The chief imports are coal and manufactured goods.

Education. The system provides that separate schools may be established by Roman

Catholics and Protestants, to be supported by public funds and continuing under the control of the Minister of Education.

The University of Toronto has over 9000 students. A dairy school and a school of mines are at Kingston, and an agricultural college at Guelph. Besides the University of Toronto, the universities are Queen's at Kingston, McMaster (Baptist) at Hamilton, and the University of Western Ontario at London. University College, Victoria College, Trinity College and St. Michael's College are federated arts colleges of the University of Toronto; while Knox, Emmanuel and Wycliff Colleges are affiliated theological colleges connected with the university.

Government. The Lieutenant-Governor, who is at the head of the executive department, is appointed by the Governor-General of the Dominion in council for five years, and is assisted by a Council or Cabinet. The Cabinet Ministers must be members of the legislature. The leader of the Cabinet is the Premier of the province, and is, with his Ministers, the real executive. The legislature consists of 90 members elected by the legal voters of the counties. The judicial department is vested in a Supreme Court of Judicature. The Supreme Court judges are appointed by the Governor-General in council. Women may vote and become candidates for the legislature or for the Dominion House of Commons. The province is represented in the Dominion Parliament by eighty-two Members in the House of Commons and twenty-four in the Senate.

History. After Canada became a British possession in 1763, the province of Quebec was organized. The first settlers in Upper Canada were immigrants from the United States, who removed to Canada during the Revolutionary War and immediately after its close. In 1791 the province of Quebec was divided into Upper Canada, which included Ontario, and Lower Canada, including the territory later known as the province of Quebec.

At the close of the Napoleonic Wars in 1816, the first emigration of settlers from Britain to Upper Canada started. Disbanded troops were seeking new homes and occupations. In 1841 Upper and Lower Canada were united, following a rebellion in 1837, headed by William Lyon Mackenzie, who demanded that Great Britain give Canada a responsible government.

Railway inflation and over-speculation caused a financial crash in 1857. A reciprocity treaty with the United States from 1854 to 1866 brought a profitable market, and the high prices received for agricultural produce during the American War of Secession brought unusual prosperity. This was

followed by the opening of cheap, fertile prairie land in the Middle West, and a Western migration. The resulting competition in agricultural production caused a depression. After delay and disagreement which shook the foundations of the Union of 1841, the province of Ontario was created in 1867 by the British North America Act, and the Dominion of Canada was formed, a union which Ontario strongly favoured.

Since the Confederation, the history of Ontario has been a record of progress along all lines of industrial and civic life, and since the beginning of the present century increasing attention has been given to the development of the vast natural resources in the north.

ONTARIO, LAKE. The smallest and most easterly of the five Great Lakes in North America, lying between the province of Ontario and the north-western part of New York State. Its maximum depth is 738 ft. It is roughly oval in shape, about 180 miles long, 53 miles wide, and has an area of about 7540 sq miles. Lake Ontario receives the waters of Lake Erie at the south-west, through the Niagara River and Niagara Falls, and discharges through the St. Lawrence River into the Atlantic Ocean.

Commercially, it is of great importance as it is navigable throughout the year by the largest vessels.

ONTOL'OGY. A term widely used in philosophy to describe that division of Metaphysics which treats of the nature of "reality," as opposed to the ever-changing world of physical appearances.

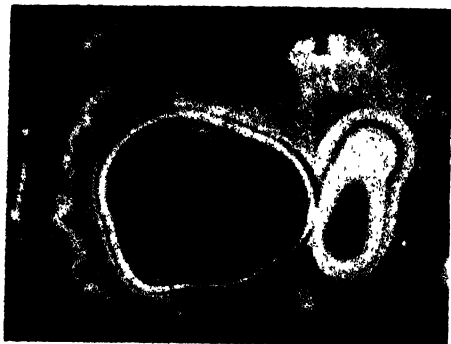
Historically, speculation about ontological subjects arose from the scepticism of the early Greek philosophers. "What," they asked, "is the 'real being' of a river, seeing that it is constantly changing?" It was this peculiarity of change in external reality which they found chiefly of interest.

Representative of the ancient school of philosophy is Plato's Theory of Ideas, by which he posited the "Ideas" (*ideae*) as eternal and unchanging spiritual types or moulds in the likeness of which every earthly material object was formed—a world of *noumena* (things apprehended only by the mind) as opposed to the world of *phaenomena* (things apprehended by the senses). The former were the only things to which true reality could be attributed. See PLATO.

More recent theories of ontology have been concerned with the opposition between realism and idealism, i.e. between the common-sense attitude of the realists that what is perceived actually exists, and the more philosophical attitude of the idealists that objects exist only in so far as they are perceived; apart from being perceived, they

could have no separate existence. See METAPHYSICS.

ONYX, *on'iks*. A form of quartz (chalcedony) that has its colours arranged in parallel bands. These are usually white and black or white and brown, but red and green also occur. Onyx is a variety of agate, which is a banded chalcedony. The sardonyx of the Bible was onyx with deep-red



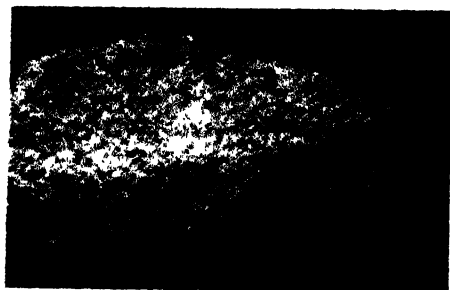
ONYX

Photo: H. E. Taylor

and white bands. Onyx is easily carved and takes a high polish.

Onyx Marble, Mexican Onyx, or Oriental Alabaster. A variety of limestone containing a small quantity of iron or manganese, which, when polished, becomes partially transparent. The iron and manganese produce clouded and banded effects, usually in shades of brown on a white background. Onyx marble is found in paying quantities in Northern Africa, Italy and Mexico.

OOLITE, *o'olite*, or **ROESTONE**. A limestone composed of rounded grains which resemble the hard roe of a fish. It is common



OOLITE

Photo: H. E. Taylor

in the rocks of the Jurassic system in Britain and is also found in rocks of the Carboniferous and Silurian formations (see GEOLOGY). Under the microscope the grains are seen

to consist of concentric layers of limestone with an obscure radiating structure deposited around some nucleus, often considered to be the remains of a lime-secreting alga.

Larger grains simulating a squashed pea are sometimes found, forming "peagrit" or pisolite.

The oolitic limestones of Bath and Leekhampton are largely used for building.

OOZE. A name given to certain deep sea deposits consisting mainly of the shells or skeletal remains of foraminifera (especially globigerina), pelagic molluscs such as pteropods, radiolaria, and frustules of diatoms. Where one of these predominates over the others the ooze is called globigerina ooze, radiolarian ooze, etc.

At great depths—above 2400 fathoms, foraminiferal oozes are less common, as the carbonate of lime of which their shells are composed becomes dissolved. The siliceous remains of radiolaria are found at great depths in certain parts of the Pacific and Indian Oceans, where they cover an area estimated at 2,000,000 sq. miles.

Globigerina ooze is especially abundant in the warm parts of the Atlantic, and covers about 48,000,000 sq. miles. Diatomaceous ooze is especially noticed in Antarctic and cold areas, and Pteropod ooze particularly in warm, tropical and sub-tropical seas near coral reefs and submarine ridges.

OPAL. A gem stone, admired for its beauty and variety of colour. The ancients believed that the stone possessed magical powers, and the superstitious fancy that if luck befalls the wearer of an opal, unless it be his birth stone, finds credence even to-day.

Opals are a compound of silica and water, the latter occurring in a proportion that usually varies from 2 to 13 per cent. The opal is never found in crystallized form; it is not nearly so hard as quartz, and is much more brittle. Of the several varieties, the most valuable is the *precious opal*, also called *noble opal*. This variety, which displays an exquisite play of colours, is usually bluish, red, or orange-white. Because of its brittleness, it is never cut into facets like the diamond, but is polished with a convex surface. The finest specimens are found in S. America, Australia, Mexico and U.S.A.

Other varieties are the *fire opal*, of a hyacinth-red colour, but sometimes orange; the *water opal*, which is bluish-white, showing reddish reflections in a bright light; and the *common opal*, which shows no play of colours and is milky and opaque.

OPEN SHOP. A term commonly used in industry to denote an establishment in which both union and non-union men may be employed, as opposed to the *closed shop*, in which non-union men may not be employed.

OPERA. An art comprised of the combination of music and the drama, and consisting of a dramatic libretto sung and acted on the stage to the accompaniment of a full orchestral score.

Modern opera owed its origin to an attempt made in Italy, at the end of the sixteenth century, to restore the method of musical declamation in which the classical Greek drama was thought to have been performed. The result was perhaps quite unlike the style of the ancient Greeks, for neither then nor now could the necessary knowledge of Greek music be had. But it was at least in the sharpest contrast to the prevailing music of its age. The dramatic element was conspicuously absent from that pure and flowing style of polyphony which was the glory of the fifteenth and sixteenth centuries. The new style, in place of that purely musical ideal, aimed at the most direct interpretation in musical terms of human eloquence and emotion. It consisted of the art of *Recitative*, a single unadorned voice part, accompanied at first by the barest possible bass alone, and designed to render the natural inflections of an orator in a convention of which the aim was almost solely dramatic. *Musica parlante* and *Stilo rappresentativo* were names applied to it. Its inventors were Gagliardi, Peri and Caccini, of whom we possess operatic works by the two latter (such as the lyric drama *Dafne*, 1594), in which the new style was made the vehicle of a true drama in music, the forerunner of the operatic tradition. Peri's *Euridice*, perhaps the first opera, was first performed in 1600.

The revolution in musical practice thus brought about was not confined to the operatic field. It led to a remarkable reversal of the whole practice of music, by turning the prevalent fashions away from the many-voiced art that had so long held sway, into the new channels of the single-voice music; from Polyphony to Monody. In this change the outstanding figure is Monteverde, a dramatic composer of the highest genius and a born rebel in art, of whose many operas three have survived to show us the quality of his inspiration. The impact of his innovations finally destroyed the old polyphonic style. But it led also to much that is most characteristic in the music of later times, it was the turning-point of modern music. See MONTEVERDE.

The reaction against polyphony was fortunately not lasting, and although the old counterpoint never returned, the contrapuntal art was again cultivated by succeeding composers, of whom Bach was the greatest. The opera shared the benefits of the returning complexity of structure, and it took on a variety of new forms in different

countries, and at different times. The Italian operatic tradition to this day preserves its characteristic individuality. Declamatory, theatrical, and colourful, it has influenced every operatic composer in greater or less degree. But at least two other sources contributed to the stream. In France, the Ballet (see BALLET) and in England the Masque, while primarily displays of dancing, possessed elements of the dramatic art which were at the root of the operatic traditions there created. Lulli and Rameau in France, Lock and Purcell in England, owed perhaps more to these native origins than to the more obvious influence of the Italian innovations. The French tradition has always differed more or less consciously from that of Italy, and has produced many famous names (Berlioz, Gounod, Bizet, Debussy and others) besides absorbing at least one native of Germany (Meyerbeer). The English tradition lapsed for a time after Purcell's untimely death in 1695, until Handel's long residence in England and his forty-two brilliant operas swamped all traces of the native school. Not until Vaughan Williams and the moderns, did English music recover from its subservience to the German style, although some very English plots are to be found in 'The Beggar's Opera', with its numerous imitations, and in the famous Savoy comic operas of Gilbert and Sullivan.

The great names of the Italian school are Monteverde (1597-1643), Alessandro Scarlatti (1658-1725), Domenico Scarlatti (1685-1757), Piccini, Gluck's unsuccessful rival in Paris (1728-1800), Pergolesi (1704-1736), Cimarosa (1740-1801), Cherubini, considered by Beethoven to be the best dramatic composer of his time (1760-1842), the tuneful Rossini, whose influence on Gilbert and Sullivan was great (1792-1868), Verdi (1813-1901), who, after winning fame with the tragic *Aida*, as an old man came under Wagner's influence and produced his two greatest works, *Othello* and *Falstaff*, and Puccini (1858-1924). Their works, while abounding in lesser innovations, form an unbroken tradition. But elsewhere the course of the art was challenged by a remarkable succession of reformers, who declared that opera, in developing its purely musical appeal by means of set arias, coloratura, and every device for vocal brilliance and display, had travelled too far from its essential function as a *drama* in musical form; that the action of the stage had become too forced and too long held up while the prima-donna dazzled the audience with irrelevant *tours-de-force*. Of these reformers, the first was the German, Gluck (1714-87). Gluck's earlier operas are in the Italian style, but his dissatisfaction eventu-

ally expressed itself in a series of masterpieces whose effect on succeeding German composers can hardly be overestimated. *Alceste* and *Iphigénie en Tauride*, are the best known. The progress of the drama is in them never subordinated to the formal interests of the music, yet the score is a wonderfully tuneful one and has many moments of the highest musical beauty. Mozart (1756-91) remained mostly in the Italian style in his unsurpassable lyric operas; but Beethoven's one opera, *Fidelio* (1805), is throughout based upon Gluck's passion for dramatic integrity, and is in every way typical of the German tradition. It is in the composer's "middle" style, of which the 3rd Symphony was the prelude, and it is a remarkable work.

It was nevertheless another German, Weber (1786-1826), who, in the name of the same great principle, ushered in with *Der Freischütz* a further revolution in the Opera, the so-called Romantic movement, of which Wagner was the prime exponent. A flair for realistic and colourful scene-painting in music, combined with a high dramatic sense and great musical ability, enabled Weber to effect a change of which the essential element lay in the transference of the preponderant interest from the vocal parts, and its division equally between the voices and the orchestra. It remained for Wagner (1813-1883), still declaiming the principle of dramatic integrity, to carry this process to its logical conclusions. In Wagner's mature operas (*Die Meistersinger*, *Tristan*, *Das Ring*, *Parsifal*) no set arias are introduced except where the story calls for them (as for the Prize-song in *Die Meistersinger*); recitative is alone allowed, but it is a recitative transformed out of all recognition from the bare *recitativo secco* of the earliest operas. Wagner termed it *melos* (song), and it consists of a flow of tuneful melody whose form is derived exclusively from the nature of the words (written by Wagner himself) and the dramatic situation of the moment; while an immense symphonic orchestra performs an independent accompaniment of great beauty and complexity. The music itself is built up of a number of themes, termed *leit-motifs*, each of which is definitely connected with one character or idea in the plot, so that its appearance, for example in the orchestra, often serves to bring into the listener's mind some connecting thought not seen or mentioned on the stage. In developing this system, Wagner achieved a unity of dramatic and musical purpose that has never been equalled, and his great "music-dramas" (as he preferred to term them) are perhaps the highest achievement of the Romantic spirit in music. Wagner's methods have been

followed by Richard Strauss, with an even larger orchestra and more romantic harmony, but with smaller success, save for the beautiful lyric opera, *Rosenkavalier*.

It remains to mention a school of opera



LOHENGREN AND ELSA

somewhat out of the main operatic traditions, though deeply influenced by them and particularly by that of Germany—the Russian opera. Glinka was the first composer to free Russian music from a predominantly German character, and his opera *A Life for the Tsar* (1836), followed by *Ruslan and Ludmilla* (in both of which Russian folk-



SCENE IN THE OPERA "CARMEN"

This production was staged in the open at Scarborough

Photo Photopress

tunes have much influence), laid the foundations of a national school whose remarkable individuality and atmosphere form one of the most unmistakable of recent contributions to the art of music. Borodin (*Prince Igor*), Moussorgsky (*Boris Godounov*) and Rimsky-Korsakov (many operas, the best and last being *Coq d'Or*, 1907), these are the brightest ornaments of a school whose most recent exponents are the modernists Stravinsky and Prokofiev. See articles on MONTEVERDE; VERDI; WAGNER, etc.

OPERA-GLASS. Miniature binoculars used in theatres by members of the audience



FORMATION OF THE IMAGE IN AN OPERA-GLASS

AB is the object; O the double-convex lens, ab, the reflection of the object; e, the double-concave lens or eye-piece.

who wish to obtain a "close-up" of the action or actors on the stage. See FIELD-GLASS.

OPHIR, *o'fir*. An ancient region, probably in Southern Arabia, famed for the abundance and fineness of its gold.

OPHTHALMOLOGY, *of thal mol' o ji*. See EYE; BLINDNESS; SIGHT.

OPHTHALMOSCOPE, *of thal' mo scope*. An instrument for examining the interior of the eye. It consists of a concave mirror from 1 in. to 3 in. in diameter, with a small opening and a magnifying lens through which the observer looks. When a bright light is placed close to and at one side of the patient's head, the light is reflected by the mirror directly into the pupil of the eye, and the observer can see a magnified image of the structure. If the eye is in a healthy condition, it will appear bright red or orange, lined with a network of darker nerves and blood-vessels. The instrument is also used in the diagnosis of Bright's disease and of brain and spinal troubles.

It was invented in 1847, but its value was not at first realized. In 1851 it was improved by Helmholtz.

OPIATE. Any drug containing opium.

OPIMUM. A powerful narcotic drug. Opium is a milky juice—air-dried until it takes the form of a white cake—obtained from the unripe capsules of a species of poppy grown chiefly in Asia. It is used by doctors to relieve pain, allay convulsions, induce sleep, and check diarrhoea. A craving for it is easily created, and care must always be taken that enough to create such a craving

is not administered. Once the habit is fixed, the victim is helpless to overcome his desire. Opium is either eaten or smoked, but some of its preparations are taken hypodermically, or as snuff. Its fascination lies in its power to evoke a sense of exhilaration and wildly fanciful visions.

The moral and physical effects of the opium habit are similar to those produced

China was followed by the general illicit growing of the poppy. See MORPHINE NARCOTIC.

OPORTO, *o por' to*. See PORTUGAL.

OPOSSUM, *o pos' um*. The common name of several species of Australian and American animals belonging to the same sub-class as the kangaroo. Their distinguishing char-



OPIMUM POPPY

(a) Ripe capsule. (b) Cross-section of capsule, showing seed.

by *morphine*, the most important alkaloid in opium. *Laudanum*, or tincture of opium, is opium, alcohol and water. Opium, however, has many uses in medicine. *Paregoric*, often given to check intestinal fermentation, is opium, benzoic acid and camphor. Opium and ipecacuanha together form the drug called *Dover's powder*.

The Fight against Opium. So widespread is the illicit traffic in opium and its derivatives that the League of Nations has sought the co-operation of all countries in the effort to suppress it. "Dope"-peddling is carried on in America and Europe, but it is in Oriental countries that the greatest havoc is wrought. In China, poppy-growing has been forbidden since 1917, when, concluding a ten-years agreement with Great Britain, the Chinese ceased importing opium from India. But the breakdown of responsible government in



SHORT-EARED MOUNTAIN OPOSSUM

Photo: Australian Trade Publicity

acteristic is the possession of an external pouch in the skin of the abdomen. Here the young, which are born in an immature condition, are kept and suckled for several weeks after birth. Opossums are the only



AUSTRALIAN RING-TAILED OPOSSUM

Photo: Australian Trade Publicity

marsupials found in America. One species has coarse, yellowish-grey hair, a pig-like snout, large, naked ears, a long, hairless flexible tail by which it can hang from tree branches, and very sharp claws and teeth.

Opossums seek their food by night. Their well-known habit of feigning death when

danger threatens has given rise to the American phrase "playing possum." Australia has several species, including the nocturnal flying opossum.

Scientific Name. Opossums constitute the family *Didelphidae*.

OPPOSITION, THE. "His Majesty's Opposition" is the term given to those members of the British House of Commons who do not support the Government programme of legislation. They sit on the Opposition benches in the House. The Leader of the Opposition is a strong political figure who is always consulted by the Cabinet in times of national crises.

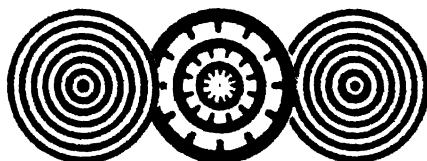
OPTICAL ILLUSION. Everyone is familiar with the appearance of parallel rows of tele-

one of the most common is that of irradiation. Any light-coloured object is surrounded in our vision by an aura of its own reflected rays and (as in the instance given below) appears larger than it is.

OPTIC NERVE. See EYE.

OPTICS. The modern use of the term "optics" refers to the science of vision and of appliances for the aid of eyesight generally. *Physical optics* is the science of the phenomena of light, and *geometrical optics* is the discussion of the theory of optical instruments, as far as it is possible with the aid of the geometrical laws of propagation, reflection, and refraction of light. The Greek word *optika* signified matters concerning vision and the nature of light.

The division of the subject into *catoptrics*



OPTICAL ILLUSIONS

- 1a. Which of the first two solid lines appears the longer? 1b. Is the line longer at the right or at the left? 2. Is each of the two white spaces the same width throughout? 3. Are the squares of different colours the same size? 4. Revolve the circles and note their apparent motion.

graph poles, apparently growing smaller as they stretch away toward the horizon, where they seem to meet; it is common knowledge that a white house looks larger than the same house painted a dark colour.

Such mistaken perceptions of reality are also called "normal" illusions, because they are due to the physiological structure of the eye, and are experienced by everyone of normal eyesight. Sometimes, as in cases where we expect so confidently to see a certain thing that we mistake the real object for the imagined one, we are betrayed by our mind as well as by our eyes.

There are many forms of optical illusions:

(Greek *katoptron*, a mirror) and *dioptrics* (Greek *dia*, through) referred to discussions of the phenomena of reflection and refraction respectively, but these terms have been little used in recent years, since a true science of optical instruments must include the study of both reflection and refraction. The term *geometrical optics* is passing out of favour for a similar reason, since the physical laws of the interference and diffraction of light cannot be neglected in the modern theory of instruments.

Fragmentary but unmistakable evidence shows that convex lenses were used as magnifiers and burning-glasses in the ancient

world, and the Greek philosophers put forward the notion of *rays* of light, i.e. the supposed paths of corpuscles passing in straight lines to the eye from the object seen; they knew the law of reflection, and had at least a qualitative knowledge of the phenomena of *refraction*, i.e. the change in direction of the path of a ray when it passes from one medium to another, as, for example, from air to water.

Law of Reflection. The incident and reflected rays make equal angles with the normal (the line perpendicular to the tangent plane to the surface at the point of incidence) to the reflecting surface at the point of incidence, and lie in one plane with the normal.

Although the Arab *el Hasson*, of Alexandria and Spain, made noteworthy advances in the qualitative explanation of the optical action of the eye, and various other visual phenomena, in the tenth century, the exact law of refraction was not discovered until A.D. 1621, when *Wilbrord Snell* found its geometrical form. It was immediately given a mathematical statement by *Descartes*, which may be paraphrased as follows—

Law of Refraction. The incident and refracted rays lie in one plane with the normal to the surface at the point of incidence, and make such angles with this normal that the ratio of their sines is constant for any given pair of homogeneous media.

In practice, a refractive index n can be assigned to a medium, and (as explained in textbooks on Light) is the relative rate of the velocity of light in air to its velocity in the medium. (The *absolute* refractive index is the relative rate of the velocity in a vacuum to the velocity in the medium.) Then, if i and i' are the angles of incidence and refraction at the boundary between two media of refractive indices n and n' respectively, the quantitative law of refraction can be expressed in the following form—

$$n \sin i = n' \sin i'.$$

Crown Glass has a refractive index of about 1.52; all solid and liquid media, in fact, have refractive indices greater than unity; it follows from the law of refraction

that a ray of light entering such a medium from air will be deviated towards the normal. The path will also be reversible. Thus, by drawing the normals at the incidence points on the boundaries and applying the above law, we can trace rays in a plane diagram through one or more surfaces of refraction as in Fig. 1. The accurate trigonometrical tracing of rays is now an essential part of the method of design of all but the simplest lens systems.

The law of Snell and Descartes applied to refraction at the two spherical surfaces of a

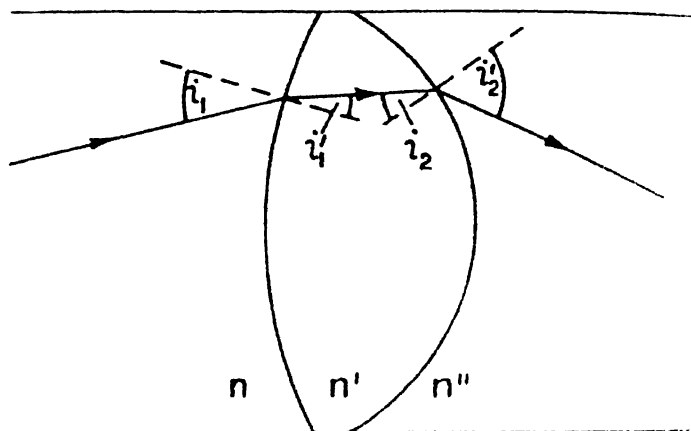


FIG. 1. RAY TRACING

thin lens shows that rays from a single point near the axis will have such a path after transmission that they will pass through (or very close to) another point known as the *image-point*. (This agrees with the ancient experiment of the burning-glass, the image of the sun is the burning-point at the focus.) It is found further that such object points situated in one plane perpendicular to the axis of the lens, are imaged very well in an image plane, also perpendicular to the axis. One object-point has but one image point; one object-plane has but one conjugate image-plane, in which the image is most sharply focused.

Study of Lenses. In the first approach to the subject, most teachers allow their pupils to gain acquaintance with such properties of lenses in a purely empirical and experimental way. If indeed a thin lens is imagined, for which the above properties hold perfectly (in geometry such a relation between the object and image spaces is known as "collinear") instead of imperfectly as in practice, a great many of the simpler quantitative relations of the image formation follow immediately. There are two principal focal points, conjugate respectively to an

axial image-point at infinity and an object-point at infinity, so that a ray passing through the first (such as CFQ , Fig. 2) must become parallel to the axis after transmission by the lens; and a ray parallel to the axis before transmission (such as CP) must pass through the second principal focus after refraction. Again, since there is in this theory only one image-point for every one object-point, the intersection of any two rays suffices to

rendered concave, and the image point is at its centre. The rays are now the normals to the wave fronts. Taking the reciprocal of the radius as the measure of curvature, it is possible to remember the algebraic relation for a thin lens,

$$\bar{v} = \bar{u} + \bar{f},$$

where v , u , and f are image distance from

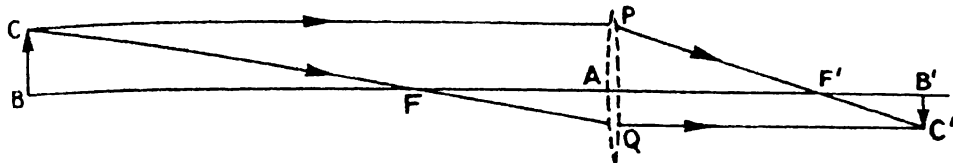


FIG. 2. IMAGE FORMATION BY A THIN LENS; RAY DIAGRAM

determine the image-point. In Fig. 2, C' therefore the image of the point C , and further, by virtue of the properties of conjugate planes, B' is the image of B .

It is then easy to deduce Newton's relation for a thin lens, e.g. that the product of the distances of conjugate planes from the corresponding principal foci is constant and equal to the square of the principal focal distance, i.e. the square of the distance from the lens to a principal focal point. This is

the lens, object distance and principal focal distance respectively, in the form

Final curvature = initial curvature + impressed curvature

The "impressed curvature," or the reciprocal of the focal distance, is usually termed the "power" of the lens, and the practical unit of power is the *dioptr*e, i.e. the reciprocal of the focal length in metres. Amongst practical opticians and spectacle makers a

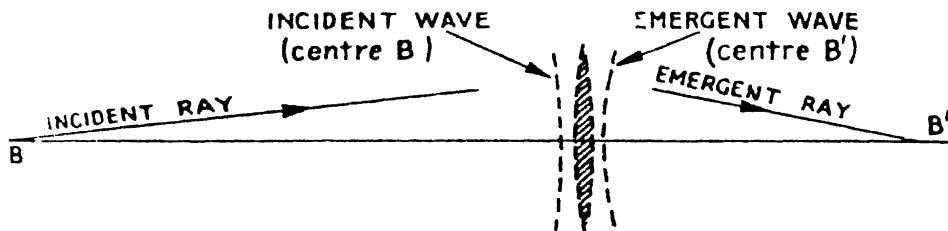


FIG. 3. IMAGE FORMATION BY A THIN LENS. WAVE-FRONT DIAGRAM

obtained by showing that the numerical ratio of object to image height is the ratio of $F'B'$ to AF' , or alternatively FA to BF . The two ratios are then equated.

Further steps in the study of lenses may take the form of the introduction of some sign convention and the formulation of algebraical conjugate-distance relations. (See the *Report on the Teaching of Geometrical Optics*, published by the Physical Society, London.) In Fig. 3 the signs to be attached to the magnitudes of v , u , and f (see below), are +, -, and + respectively. Some prefer to illustrate such relations by the conceptions of Huygens, in which the diverging spherical wave-front derived from an object-point passes into a lens and suffers the greater retardation in the thicker parts of the lens, the velocity in the glass being smaller than in air. In Fig. 3 the wave front has been

converging lens, thicker in the centre than at the edges, has a positive power, and a diverging lens has a negative power.

A great deal of the properties of lenses can be learned from simple constructions and corresponding experiments. Such were indeed the paths followed by the early optical workers, for spectacles had been in use since their (supposed) invention by Salvinus Arnatus at the end of the thirteenth century, and even the invention of the telescope and compound microscope must be credited to Jamesen or Lippershey (or both), Dutch spectacle makers, at about A.D. 1609, before the exact law of refraction was known. Galileo and Kepler were able to effect important improvements in the telescope, purely on the basis of empirical knowledge, before the work of Snell, and, in fact, it was not until the time of Fraunhofer (1787-1826)

that optical instrument making finally emerged from the "cut and try" stage. Had the discovery of the dark lines in the solar spectrum made exact measurements of refractive indices possible at an earlier date, Newton (1642-1727) would not have despaired of the refracting telescope, and might have anticipated Chester Moor Hall (1729) in the invention of the achromatic lens.

For the aberrations of lenses, too, were first known and attacked empirically. *Chromatic aberration*, which is due to the variation of refractive index with wave length, affects and colours images formed by white light, unless the defect is removed by the use of combinations of lenses of different dispersive powers. There remain the aberrations of definition; *spherical aberration*, affecting images on the axis; *coma*; and *astigmatism of oblique pencils*, affecting images away from the axis. The aberrations of position, i.e. *curvature of field and distortion*, may be present. Many of the familiar kinds of lens systems, eye-pieces and the like, were developed on empirical lines. Theory, however, began to gain ground.

The work of Cotes (1682-1716), R. Smith (1689-1768) and others helped to prepare the way for the far-reaching simplifications effected by Gauss (*Dioptrische Untersuchungen*, 1840), in which the theory of thick lenses and optical systems generally was treated. Clerk Maxwell and Möbius helped to bring the general theory into relation with the ideas of collinear image formation typified above.

The theory of the aberrations naturally presented greater difficulties, but here again the work of Coddington (1829 and onwards), Petzval, and von Seidl (about 1850) placed the study on sound foundations, so that the conditions for the removal of the various defects have become fairly well known.

The production and availability of a wide variety of optical glasses has made it possible to design systems in which the effects of aberration are negligible. Telescopes and microscopes are made free from spherical aberration and coma (*aplanatic systems*), and photographic lenses are freed from curvature of the field, astigmatism of oblique pencils, and coma, as well as from serious spherical aberration. These are *anastigmatic lenses*.

Analytical methods have been developed which can be used to determine the main features of a design for the simpler instruments, but the more complex systems can only be designed with the help of empirical methods, largely dependent on trigonometrical ray-tracing.

Even the more elegant mathematical methods, such as Hamilton's use of the

"Characteristic Function," have failed to yield formulae simple enough to deal with any but the simplest optical systems, and their interest is probably more theoretical than practical; but there are certain features of the older theories of collinearity which have, at most, an uncertain connection with the properties of actual systems, and it is the modern tendency to place more emphasis on the study of the exact laws concerning rays with sagittal symmetry (see, for example, the report to which reference has already been made). The following short list of textbooks in English is intended merely to suggest an introduction to some representative parts of the subject; they can be read together, without difficulties arising owing to conflicting sign conventions.

W. H. A. Fincham, *Optics*.

Ensley and Swame, *Ophthalmic Lenses*.

Martin, *Applied Optics*, Vols. I and II.

Conrady, *Applied Optics and Optical Design*.

The reader will, however, do well to study the Physical Society *Report*, to which reference was made above, for a full discussion of the methods and conventions which may be used to the greatest advantage. The *Report* gives notes respecting many textbooks on the subject. See LENS, LIGHT.

OPTIMISM. In philosophy, the belief that there is more good than evil in the world, and that the good will ultimately triumph over the evil. (The word is derived from Latin *optimus*, best.) From Socrates to Leibnitz, who was the greatest modern optimist, philosophers have held that evil is in the world so that men may learn to choose the good. The optimists hold that everything in Nature, being the work of God, is ordered to produce the highest good, and that, since God is all-wise and all-powerful, this is the best possible world. He could conceive and create. The theory is thus the exact opposite of pessimism, the followers of which believe that the world is essentially evil. See PESSIMISM.

OPTION. In finance, a right established by contract, giving one party the privilege of buying (or selling, as the case may be) at a future date certain property at a price fixed in the contract. On the Stock Exchange and the Produce Exchanges the option to buy is a "call option," the option to sell being known as a "put option." The double option to buy or sell is a "put and call option." An operator on the Exchange, by purchasing the desired option, can limit his possible loss.

For the meaning of "option" in local government, see LOCAL OPTION.

ORACHE, *orrâch*. A plant resembling spinach, for which it is occasionally used as a

substitute. The plant is a low shrub, and its varieties are found wild on the sea-shores. It bears axillary spikes of small yellowish-green flowers in the autumn. In cultivation, it flourishes in a gravelly soil. The spreading halberd-leaved orache is abundantly found on salt marshes. The flowers are frequently tinged with red. The garden orache was at one time very frequently cultivated for the table in Great Britain, but has now been replaced by spinach.

Scientific Names. Orache is in the genus *Atriplex*. The spreading halberd-leaved orache is known as *A. patula* and the garden orache as *A. hortensis*.

ORACLES. These, in mythology, were the replies given to inquirers by the gods and goddesses they worshipped. Sometimes, too, the name was applied to the temple or place where the responses were given. Almost all the peoples of antiquity believed that their deities interested themselves in man's personal affairs, and that, if inquiries were made, the gods would give them such advice as to guarantee success in their undertakings, or at least foretell future events so that they could know whether or not an enterprise was a wise one to undertake. Families of priests or interpreters delivered the messages of the gods. Not all places were equally favourable for the consultation of a god, and some particular localities, such as Delphi and Dodona, came to be known as especially fruitful of results.

Sometimes the oracles came through signs, which were interpreted by an attendant, sometimes those who wished to consult a god slept in a hall of his temple and received messages through dreams, which were explained by the priests. Very frequently, the replies of the gods were so ambiguous that almost any meaning might be attached to them. Many of the oracles degenerated into places where trickery and charlatanism were openly practised at the expense of credulous worshippers. See DIVINATION.

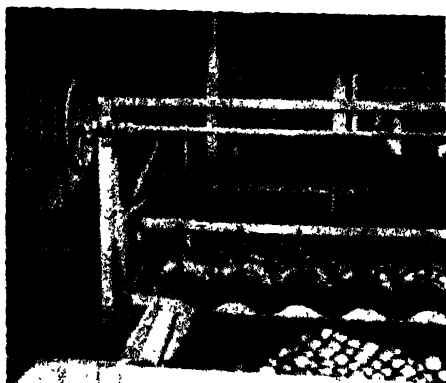
ORAN, or ahn'. A city in Algeria (which see).

ORANGE. A citrus fruit. The mass of juicy pulp, arranged in from eight to twelve wedge-shaped sections, is surrounded by a tough, porous, golden-yellow peel. Most varieties contain several seeds in each section or slice, but seedless oranges are now grown in increasing quantities, notably in California; these are for the most part *navel* oranges, so named because of a peculiar growth near the top.

The trees are evergreen. Under cultivation they rarely grow higher than 30 ft., and are usually kept shorter for convenience in gathering the crop. The branches hang low and bear glossy dark-green leaves, which are finely toothed, pointed at the tip, and

winged at the base. The flowers are borne singly or in small clusters, and are white, wax-like, and fragrant. Sometimes green fruit, ripe fruit, and blossoms may be seen at the same time on the trees.

Distribution and Kinds. From its native home in Eastern Asia, the orange has made its way into warm countries in many different parts of the world. The early Spanish explorers carried it to South America and Florida, and it was introduced into California, the chief orange state in America, by the Franciscan Fathers. Oranges are now cultivated in Spain and Portugal, Southern France and other Mediterranean



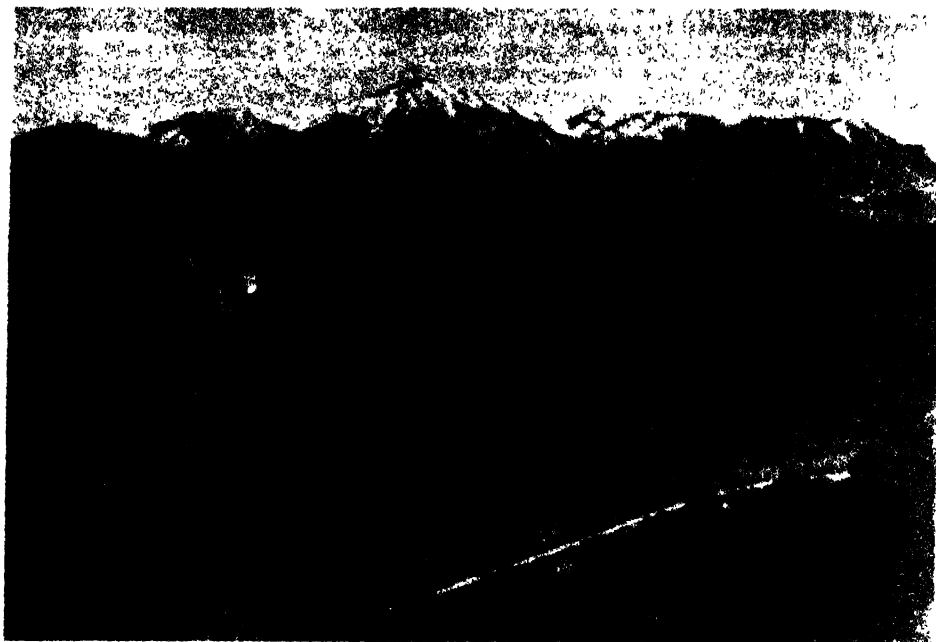
ORANGES IN CYLINDER BRUSH WASHER
Photo Keystone

countries, in India and Southern Asia, South Africa, the East and West Indies, America and Australia.

There is also a group of small hardy oranges, characterized by a skin that is easily removed from the pulp. To this group belong the *tangerine* (which see), the *Satsuma*, and the *mandarin*. A sour orange, not usually eaten as a fresh fruit, which is extensively cultivated in the neighbourhood of Seville for marmalade, is often used as stock for the propagation of sweet oranges.

Orange Culture. Plants are raised from seed; as a rule, the seedling is a variation from the parent stock, and desired varieties are usually obtained by budding (see GRAFTING—Bud Grafting). Rich, moist soil with good drainage is best. Sweet oranges cannot be grown in the open where frosts occur during the growing season, as in England.

In warmer climates, healthy trees two years from seed are ready to bud, and a year or two later are set into an orchard. Pruning is done regularly, to remove dead and useless branches. About four years after budding, the trees begin to fruit, and with proper pruning and care, one tree produces 500



ORANGE GROVE IN CALIFORNIA

Photo: Purce

or more oranges each year for from fifty to a hundred or more years.

Uses. Not only is the juicy orange a popular dessert fruit, but the juice itself makes a most refreshing drink. Because it contains Vitamin C, which helps to prevent scurvy (see VITAMINS), orange juice is used in modern infant feeding as an addition to milk. Oranges are used in the making of marmalade, and the peel flavours puddings and, when candied, fruit cakes. The leaves of the orange tree and small, unripe fruit contain a volatile oil which is employed in the manufacture of perfumes.

Scientific Names. Oranges belong to the rue family, *Rutaceae*. The common sweet oranges of commerce are derived from *Citrus sinensis*; the sour or bitter orange is *C. aurantium*; *C. bergamia* is the species from which bergamot oil is obtained (see BERGAMOT). See also CITRUS.

ORANGE. A colour of the solar spectrum, appearing between the yellow and the red. Orange is a reddish-yellow colour, and may be produced by mixing a small quantity of red with yellow pigment. The tint varies with the proportion of red used. There are numerous orange dyes on the market, having different tints and hues, and each bearing its specific name, as *cadmium orange*, a deep-orange shade of cadmium yellow. Most orange dyes are prepared from coal tar and

designated by numbers, as *orange I*, *orange II*, etc. See COLOUR; LIGHT.

ORANGE, WILLIAM OF. See WILLIAM III OF ENGLAND.

ORANGE FREE STATE. One of the provinces of the Union of South Africa. It lies between the Cape of Good Hope Province to the south and the Transvaal to the north, and is entirely removed from the sea. The area is 49,647 sq. miles. Physically it forms part of the lofty plateau of South Africa and is in the main overlain by Secondary rocks. Nearly the whole is over 4000 ft. in height. The climate is warm, with a decreasing rainfall toward the west, so that only the east is suited for much cultivation. The rivers are few and of little importance, except the Caledon valley in the south-east.

The population number 205,324 of European descent (1931) and 440,000 coloured (1921). Education is controlled by the Union government: it is free and compulsory from the age of 7 to 16 as a rule. Grey College is a constituent college of the University of South Africa.

The chief occupation is sheep-rearing, but increasing quantities of wheat and maize are being grown in the south-east and north respectively. Diamonds and inferior coal are the chief mineral wealth.

Bloemfontein (white population 28,503) is

the capital; it has mills and engineering works. There is no other large town. Railways link the state with the Natal and Cape ports.

It was in 1835-36 that the great Boer trek north of the Orange River began. Difficulties with the Griquas led to British annexation of all the country south of the Vaal in 1848, but this was renounced in 1854 and the Orange Free State was recognized. In 1897 the State confirmed a defensive alliance with the Transvaal. As an outcome of the South African War, 1899-1900, the State was annexed to the British Empire as the Orange River Colony, but its old name was restored on its joining the South African Union in 1910. See UNION OF SOUTH AFRICA.

ORANGEMEN. Members of a society formed in 1795, taking its name from William of Orange, and devoted to the furtherance of Protestant interests in Ireland by all possible ways and means. Their militant enthusiasm has frequently led them into conflict with the law. Lord (then Sir Edward) Carson was their leader in organizing the resistance to Home Rule in 1912. They are now confined to parts of Ulster.

ORANGE RIVER. The longest river of the Union of South Africa, which, with many curves to the north and south, extends almost across the southern part of the continent. It forms the northern boundary of the province of Cape of Good Hope, separating it from Orange Free State, Bechuanaland, and South-West Africa. Rising in the highest eastern mountains, in Basutoland, less than 200 miles from the Indian Ocean, and emptying into the Atlantic, its channel extends over 1300 miles, and in its winding course it drains 400,000 sq. miles of territory. The largest of several tributaries is the Vaal.

Dangerous sand bars make it at all times inaccessible to sea-going vessels. Above the bar, small vessels navigate the river for limited distances.

ORANG-UTAN, *o rang' u tan'*. From a Malay word meaning "man of the woods," the term designates a large man-like ape which inhabits Sumatra and Borneo. It is from 4 ft. to 5 ft. high and is covered with coarse, red-brown hair; its skull is higher than that of any other ape, and its brain is next in size to man's. The arms are extremely long, reaching to the ankles when the animal stands erect.

Whenever possible, the ape makes its way by swinging from branch to branch in the trees. Nests or platforms are built about 25 ft. above the ground, and are used for sleep and refuge. The orang-utan subsists on vegetable food. When on the ground the

animal uses its arms as forelegs, placing the knuckles on the ground, but occasionally it raises itself on its feet, and grasping branches



ORANG-UTAN
Photo Bond

overhead, walks upright. These apes live alone or in pairs, never in communities. See APE.

Scientific Name. The orang-utan belongs to the family *Simiidae*. Its scientific name is *Simia satyrus*.

ORATOR' IANS. See RELIGIOUS ORDERS.

ORATORIO. A dramatic poem of sacred character set to music. Solo voices, a chorus, and a full orchestra (often with an organ added) take part in what is essentially a composition in the grand style. But normally to-day there is no scenery or acting, except in the large-scale productions.

Sacred scenes have been presented in dramatized form and to musical accompaniment from as early as the Middle Ages at least. But when the new Italian composers at the end of the sixteenth century were effecting that change of style from which the opera evolved (see OPERA), oratorio as we know it was also able to come about. The year 1600 saw perhaps both the first opera and the first oratorio performed; the opera being Peri's *Euridice*; the oratorio, Emilio's "*La Rappresentazione dell' Anima e del Corpo*," an allegorical drama on sacred themes intended for full stage performance by singers, dancers and instruments. The

two works are similar in style; and for a considerable period the two arts followed a parallel course of development, save that oratorio soon lost its acted form, and became an unstaged drama. Carissimi and Alessandro Scarlatti, two of the leading operatic composers of the seventeenth century, both left their mark on the oratorio; and the latter left it essentially in the form which it has retained to this day.

The first oratorio of Handel—perhaps the most famous of composers in this form—appeared in 1704 at Hamburg. It differs in style from the Italian tradition, and had precursors of its own in the true German vein, of which the earliest known example would seem to have been produced in 1623 at Dresden: Schutz's *Die Auferstehung Christi*. The German school followed less obviously dramatic lines than the Italian. The typically German chorale-tunes played a considerable part in its formation. It achieved a dignity and depth of purpose that set the stamp on the future course of oratorio, and caused it to diverge increasingly from the operatic art. In the three sublime oratorios of J. S. Bach, the *Passion according to St. John*, the *Passion according to St. Matthew*, and the *Christmas Oratorio*, that German tradition reached its height. With the migration of Handel to England, it was transplanted on to British soil, undergoing some characteristic modifications in the process. A certain heavy emphasis, perceptible in most of Handel's music, is in his seventeen English oratorios given full scope. It is responsible for no little of their massive grandeur, and combined with his somewhat theatrical dramatic sense, his relatively simple emotions, and his great technical virtuosity, it has secured for them a lasting place in the popular imagination. *Saul* (1739), *Samson* (1741), and *The Messiah* (1741), are his best known works. With them may be classed Haydn's two famous oratorios, *The Creation* (1798) and *The Seasons* (1801), produced when their composer was an old man of nearly seventy years, in the Italian form, although their music is Germanic enough.

Since Haydn, the tradition of oratorio has been fitful though not unfruitful. Beethoven produced an early and not wholly felicitous oratorio. Spohr, Bennett and others wrote many more. But only two were able to enter that unique preserve of popular affection which is the special mark of the most famous oratorios: Mendelssohn, with his early *Saul* (1836) and his later work, *Elijah* (1846)—whose popularity rivals that of *The Messiah*—and in our time, Elgar, with the *Dream of Gerontius* (1900), *The Apostles* (1903), and *The Kingdom* (1906), all of them works in the grand manner.

ORBIT. See **PLANET**.

ORCHESTRA. A group of musicians playing together on various stringed, wind, and percussion instruments. The term *orchestra* refers especially to the large concert organization which plays classic and modern orchestral compositions. An orchestra is distinguished from a military band by the predominance of stringed instruments, a group which the band does not employ.

From a concert orchestra can be derived the greatest colour and variety possible in music—every tone, every note, every vibration known to music is within it, for every type of instrument is represented. There are, for example, the *stringed instruments*, the foundation of the orchestra. They include a complete harmony in the soprano and alto tones of the first and second violins, the tenor of the viola, the bass harmony (or in solo parts, the tenor) of the violoncello, supported by the deep tones of the huge double-basses. The *wood-wind* family includes the flute and piccolo, the oboe and its alto *cor anglais*, the bassoon, and the clarinet. The brasses consist of the French horn, the trumpet, trombone, and tuba. The drums—kettle-drum and snare and bass drums—and all of the special devices for sound, such as bell, triangle, tambourine, cymbals, etc., make up the group of *percussion instruments*. A full concert orchestra with from fifty to a hundred players will have each of these instruments represented by at least one performer, in the case of the strings, the number of first violins is usually from ten to fifteen; the second violins, ten, with eight to ten violas, violoncellos, and double basses. Small or amateur orchestras often consist of two or three stringed instruments, a flute and clarinet, one or two horns, and a drum. Stringed orchestras make use only of the violins, violas, violoncellos, and double basses.

The harp is also found in large orchestras, for special effects several harps are often used, as in Wagner. The piano is often used as a solo instrument in concertos, accompanied by the orchestra. Modern composers (e.g. Stravinsky) are experimenting with it as a vital part of most small orchestras.

Without a leader, an orchestra could not function, for there could be no concerted action of all these varied instruments. The conductor plays upon the orchestra as though it were really one huge instrument, with infinitely varied possibilities for expression. He must be a highly trained musician as well as a director, for he must interpret the work of a composer; he must know the technique of each of his instruments and how to direct them, individually and collectively,

so as to obtain the tone picture he wishes to present.

History. The modern orchestra, like opera, had its beginning in Italy, and developed as an accompaniment to dramatic music. The operas of Monteverde in the seventeenth century are said to mark the starting-point of the modern orchestra. Its independent development did not come until a century later. Almost every famous musician made his contribution to the enlargement and musical growth of the orchestra; Bach, Handel, and Gluck were important figures, and Haydn is called the "father of the modern orchestra," for he fixed the forms of the quartet and the symphony, increased the number of instruments, and enlarged the scope of expression of each. Mozart gave tone colour to orchestral composition; Beethoven, the last great classical composer, produced symphonies which, according to most lovers of music, have never been surpassed. Other great names include Schubert, Mendelssohn, Berlioz, Brahms, Wagner, Richard Strauss, Tchaikovsky, Dvorak, Rimsky-Korsakov, and Debussy.

An interesting modern departure from the standards of orchestral composition is the tendency, first led by the Russian school of orchestration, to individualize each instrument at the expense of the harmonic mingling of the group; its principal exponent is Stravinsky. Experiments with "jazz" as an orchestral form have also been made by several famous orchestras.

How to Enjoy a Symphony Concert. The first thing which will impress the novice in listening to a symphony orchestra is the great complexity of musical sounds. It should be borne in mind that most music is fairly polyphonic in character, which means that there are frequently many melodies and fragments of melodies being played simultaneously, thus creating a marvellous musical mosaic. It is impossible for the human mind to follow through this weaving and interweaving of melodies in one hearing; indeed, it takes repeated hearings of the same composition. One of the delights of "creative listening" is that of discovering new charms and hidden beauties each time one hears a composition.

To make a beginning, try the experiment of concentrating the attention upon some instrument possessing a distinctive tone quality, such as the oboe, or upon the group of first violins or upon some other group playing in unison, trying to follow the one particular part to the more or less exclusion of the other instruments. At first this will require a determined effort of the will, and you will be easily confused.

Try, also, the experiment of focusing the

attention upon the string group, upon the brass group, and again upon the wood winds. As you listen, you will be struck by the vast amount of repetition of musical ideas—a theme, a fragment of melody, or a musical figure will be hurtled from one section of the orchestra to the other with the utmost abandon, and cause you to marvel at the ingenuity of the composer.

Derivation and Use of Word. In the Greek theatre, the *orchestra* was the space between the audience and the stage, in which the chorus and musicians were stationed. In the modern theatre, the word designates the same space, now given over to the musicians. It also applies both to the players and their instruments. See also INSTRUMENTS; MUSIC; SYMPHONY.

ORCHHA. A native State in Central India, the oldest and highest in rank of the Bundela principalities. The town of Orchha, on the Betwa River, was formerly the capital but has been replaced as the centre of government by Tehri, a city some forty miles to the South. Some grain and cotton cloth is exported. The area of the State is 2080 square miles and the population, which is mainly Hindu, was 314,661 in 1931. The Maharaja of Orchha is entitled to a salute of fifteen guns.

ORCHID, or 'kid. A plant family with many species of complex flowers. There are over 6000 species altogether, but not all are rare hot-house flowers. A large number of



HOT HOUSE ORCHID

Laelia-Cattleya Schroderiana.

Photo: Central

wild flowers found in damp woods and by streams in Britain belong to the family, e.g. the Lady's Slipper and the Early Purple orchis (see ORCHIS). Certain tropical species assume strange forms, some resembling insects, others almost lacking coherent shape.

Most orchids of tropical countries are "air plants." They attach themselves to the

bark of trees and send roots into the air, from which they receive their nourishment. Orchids of temperate regions grow from bulbs in the ground. Cultivated species of the greenhouses are chiefly from tropical America, India, and Australia.

All orchid blossoms are of extremely irregular shape, and seem constructed for fertilization by insects. There are three sepals and three petals, often brilliantly



ORCHID (TROPICAL), SHOWING AIR ROOTS
Visual Education Service

coloured. One petal is always developed in a peculiar manner, and is called the "lip." In some species it is a long, narrow strip; in others, a broad fringed surface; and in still others, a pouch or sac. This lip is especially marked to guide visiting insects to the nectar within. Before the honey can be reached, however, the insect must brush against pollen masses, and either rub the pollen dust against a sticky pistil before leaving or carry with it a bundle or two of pollen, to be left on the pistil of the next orchid blossom it visits.

One species of orchid furnishes the vanilla of commerce.

Names. The orchid family is *Orchidaceae*. The "air plants" are *Aerides*. Other tropical species are *Cattleya*, *Odontoglossum* and *Cymbidium*.

ORCHIS. Name denoting the hardy orchids, some of which are native to Britain. They are perennial plants with tuberous roots, leathery elliptical leaves, the flowers growing in simple spikes or clusters on erect and unbranched stems. The flowers are usually coloured purple and are mottled with various other tints. Frequently the petals of the flower consist of six parts, three of which are the corolla, or inner petals, while the other three correspond to an outer case, or calyx. Often one of the inner petals increases its size and varies its shape and colour, and becomes the characteristic "lip." The flowers are often very fragrant. The Early Purple orchis flowers in May and June. Each flower emerges from a twisted ovary and has a long spur. The military orchis is a tall-growing species, with purple short-spurred flowers. Many native orchids can be grown with success in rock gardens or in fern borders. A popular variety is Lady's Slipper.

Scientific Names. The British varieties include Early Purple orchis, *Orchis maculata*, military orchis, *O. militaris*; bee orchis, *Ophrys apifera*, fly orchis, *O. muscifera*; Lady's Slipper, *Cypripedium*.

ORDAINERS, LORDS A committee of barons headed by Thomas, Earl of Lancaster to make ordinances and laws for Edward II, who was regarded as incapable. They proved no better themselves and, in the consequent reaction, the king was able to gather his powers and suppress them.

ORDEAL AND COMBAT, TRIAL BY. In a primitive stage of culture, it is assumed that supernatural power will intervene to protect the innocent and punish the guilty. This belief, or relic of earlier law, is found in the jurisprudence of the Middle Ages. In England the trial by "Judgment of God," known as the *Ordeal*, was a recognized mode of procedure. As late as the reign of King John (1199-1216), bishops and clergy were directed to use the ordeal by "iron, water, and fire," which was always surrounded by all the solemnities the Church could employ. The *ordeal by fire* was performed by taking in the hand a piece of red-hot iron from 1 lb. to 3 lb. in weight. If the suspected person was unharmed, he was declared innocent; if injured, he was deemed guilty.

In the *ordeal of the bier*, if one guilty of murder touched the dead body of the victim, it was believed that the blood from the corpse would begin to flow.

In the *ordeal by water*, the accused plunged his bare arm to the elbow in boiling water, his innocence being established if he escaped unharmed.

Trials by ordeal were naturally opposed by the intelligent, and the decrees of Pope Innocent III in 1215 and Pope Honorius in 1227



SOME OF THE ORCHIDS

1. *Phalaenopsis Callosum* (Cochin China). 2. *Oncidium Tigrinum* (Mexico). 3. *Laelia Skenei* (Antigua).
4. *Cattleya Loddigesii* (Brazil). 5. *Dendrobium Phalaenopsis* (Van Sander's). 6. *Cypripedium Insigne Sanderæ* (Sanders Lady Slipper). 7. *Epidendrum Fragrans*.

suppressed them in the Church. In England the Instructions of Henry III, issued in 1219, forbade them; and in Germany the decree of Frederick II suppressed them. Certain forms of trial by ordeal still exist, notably among the Hindus and some tribes in Africa.

Trial by Combat, or Battle. This form of trial, differing from an ordinary fight or duel in that Divine intervention on behalf of the righteous was expected, became common in England after the suppression of ordeals by Henry III.

In England the procedure began when the accuser announced his charge, and caused it to be proclaimed at five successive county courts. If the accused did not appear, he was outlawed; if he did, he might plead exemptions and his pleadings be upheld by the court; otherwise he must offer battle. The general procedure was for the accused to fight the accuser without sanction of a court. A lord could appoint a retainer or champion to fight in his place, and women and priests were usually represented by others.

Trial by combat was introduced into England by William the Conqueror and died out very gradually. The actual abolition came only in 1819 after a man accused of murder had claimed trial by combat.

ORDER. In botany and zoölogy, in the classification of plants and animals, an order is a group of *genera* (plural of *genus*) made up of individuals which resemble each other in structure. Order is a division below the *class* but above the *family*, although in botany the terms *order* and *family* are often interchangeable. See **CLASSIFICATION**.

ORDERLY. In armies, the term originally denoted a senior non-commissioned officer, charged with message-carrying by his officer, usually the first sergeant in a company; now usually restricted to the soldier—officer or other rank—in attendance on a senior on duty for the day, such as orderly-officer, orderly-sergeant, corporal, or drummer.

An Aide-de-camp is sometimes referred to as the general's orderly-officer.

ORDER OF THE GARTER. See **GARTER**, **ORDER OF THE**.

ORDER OF THE THISTLE. See **THISTLE**, **ORDER OF THE**.

ORDERS (ARCHITECTURE). See **COLUMN**.

ORDERS AND DECORATIONS. These are divided into the *badges* of Orders of Chivalry, and *medals* struck to commemorate some event or achievement; both are now used to reward distinguished and long service to the Crown or nation and acts of conspicuous gallantry.

Orders of Chivalry. The earliest were founded to encourage chivalry and high

ideals amongst the prelates of the Church, the nobility and statesmen; such are the *Golden Fleece* of Spain and Austria and *The Most Noble Order of the Garter* of England, which, outside royal circles, are almost entirely hereditary in certain distinguished families.

The Garter was founded in 1349 by Edward III. *The Most Ancient and Most Noble Order of the Thistle* was founded in 1540, to be followed a hundred years later by *The Most Illustrious Order of St. Patrick*, representing Scotland and Ireland respectively.

By this time, almost all European and many Eastern sovereigns had created Orders of Chivalry as a means of gratifying distinguished men and women at their courts.

Of recent years, these orders have been used to recognize high achievement in statesmanship, the learned and fighting professions, poetry, art and drama and literature; and in order to prevent them from becoming too

common, the tendency has been to limit the size of existing Orders and create new ones to meet extraordinary circumstances, such as existed in the World War.

The power to appoint to, or advance in the Order, usually reserved to the Sovereign, is known as *Patronage*.

A person upon whom an order or decoration has been conferred, and who has performed a deed meriting further recognition, can either be promoted to a higher class (advanced in the Order) or given a bar to wear on his V.C., D.S.O., or D.F.C.

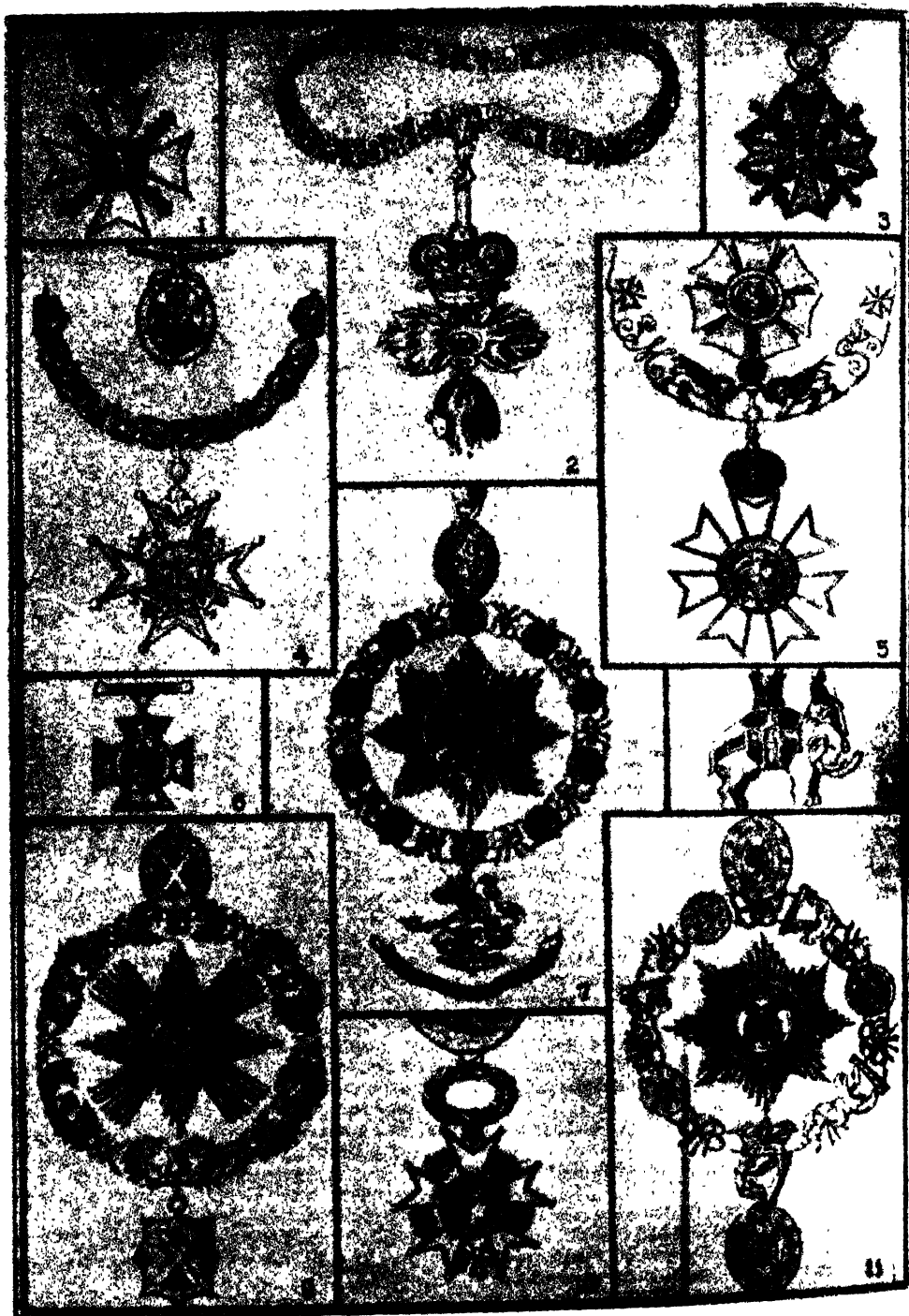
Probably the best known of foreign Orders are the French *Legion of Honour*, carrying exemption from search by the French Customs, and founded by the Emperor Napoleon I; the *Croix de Guerre* of France and Belgium; the Tsarist Russian *St. Anne*; the *Iron Cross* of Germany; the *White Eagle* of Serbia, and the *Nile* of Egypt.

are either commemorative—such



CROIX DE GUERRE

Photo: U. & U.



ORDERS AND DECORATIONS

1. Order of St. Olaf, Norway. 2. Golden Fleece, Spain and Austria. 3. Black Eagle, Prussia. 4. Order of the Bath, Great Britain; upper, diplomatic and civil; lower, collar and badge. 5. Star and collar, Order of St. Michael and St. George. 6. Victoria Cross, Great Britain. 7. Order of the Garter, Great Britain. 8. Order of the Elephant, Denmark. 9. Order of the Thistle, Great Britain. 10. Legion of Honour, France. 11. Order of St. Patrick, Ireland.

as those struck after the defeat of the Spanish Armada and those granted for taking part in certain campaigns, battles or events—or are conferred as personal rewards for gallantry or distinguished service.

The latter include the Order of Merit and Companions of Honour, with both civil and military divisions, and the V.C. for civilians, sailors, soldiers and airmen; the D.S.O., M.C., D.S.C., D.F.C., D.C.M., and the Indian Order of Merit are open to members of the fighting services. The Royal Red Cross is granted for distinguished ambulance or hospital work. The King's Police Medal for exceptional exploits by Police Officers, the Albert Medal for gallantry on sea or land, whilst the Imperial Service Order (1902) is restricted to Civil Servants at home or abroad.

All the above medals and, of course, the badges of Orders, are senior to and worn before war medals, the senior on the left of the left breast.

Other important personal medals are the Long Service and Good Conduct Medal of the Regular Army, for over 110 years enjoyed by one line regiment only as the "Fifth Order of Merit"; the Volunteer and Territorial Decorations; and the Medal of the Order of the British Empire.

War Medals were originally awarded to those of Field Rank (Major and above) only, often limited to those of selected regiments, which had specially distinguished themselves in a particular campaign. The next concession was to grant them to all actually present in the battles, but as the size of armies increased, it became the established custom to issue medals to all combatants in the theatre of war, and to add bars to commemorate individual engagements.

The Peninsular and Crimean medals were so long delayed in issue, that many who had earned them did not live to wear them. A corporal of the Fifth Foot served throughout the former campaign in one or other battalion, he received a Peninsular Medal with 12 battle clasps or bars and the regimental Order of Merit, First Class.

After the World War, over six million British War Medals were issued, with nearly 400,000 1914 Stars, to recognize the services of the "Old Contemptibles" in France and Flanders.

The seniority of the principal British Orders of Chivalry is: Garter, Thistle, St. Patrick, Order of Merit, Bath, Star of India, St. Michael and St. George, Indian Empire, British Empire and Royal Victorian Order.

Each order is divided into several classes, the head of the order being the Sovereign. Each class has its own token, for instance, Companions of the Bath wear the insignia

round the neck, a Knight Commander wears a star on his breast; and Grand Cross has the broad ribbon of the Order worn as a cross sash.

New Zealand is the only British Dominion or Colony to possess a separate order in The *New Zealand Cross* for conspicuous bravery, instituted in 1869—there was one surviving holder in 1932.

ORDERS, Holy. According to Church doctrine, those who enter the ministry can only do so on being duly ordained to their office by means of the imposition of hands by a bishop of the church, together with the invocation of the Holy Ghost.

The three chief Orders recognized throughout the whole Church from the earliest times are those of Bishops, Priests and Deacons. The Roman Catholic Church also recognizes one major Order of subdeacons, and four minor Orders of acolytes, exorcists, readers, and doorkeepers, and the Eastern Orthodox Church recognizes the first, second, third and fifth of these. In neither of these Churches are the minor orders of much importance at the present day.

Holy Orders can only be conferred by a bishop, who has this power by the virtue of his own ordination and consecration. Scripture warrant for this practice is found in various passages in the Acts and the Epistles of St. Paul, and the evidence upon the point will be found in the following texts—Acts, vi. 6 and xiv. 23, 1 Tim. v. 22, II Tim. i. 6 and Tit. i. 5. It is claimed that these texts give the necessary proof that the power of ordination is attributed to the Apostles and their successors in the Episcopal office.

The New Testament evidence, however, has been made a matter of controversy, because the words for Bishops and Presbyters (i.e. Priests) are to some extent used interchangeably. There is no doubt, however, that by the end of the second century the position of a bishop as one of superior authority was unquestioned, and it is accordingly argued that the tradition must have dated from Apostolic times.

By the teaching of the Church, therefore, reception of valid Orders—with the powers they convey of administering the sacraments, preaching the Word, and performing the other functions of a Minister of the Church—depends upon the Episcopate, and the Episcopate depends upon what is called the Apostolic Succession, the doctrine of which can be stated as follows. The Apostles received their power from Christ. "As the Father hath sent Me, even so send I you." They afterwards appointed others by the external rite of the imposition of hands to perform the same functions. These, in their

туру, ordained others with the same powers and so onwards, thus making a succession down the ages.

Presbyterians admit only one Spiritual Order, that of Presbyters, in whom the power of ordination is vested; and of the other Christian bodies in which differing views are held on the subject of the ministry, it may be said generally that no such sharp and uniform distinction is made between ministers and laymen as is inherent in the Church principle.

ORDERS IN COUNCIL. See PRIVY COUNCIL.

ORDERS, RELIGIOUS. See BENEDICTINES; DOMINICANS; FRANCISCANS; JESUITS; MONASTICISM; RELIGIOUS ORDERS.

ORDNANCE. In the form *ordnance*, the word meant any organization, disposition of troops, or equipment; it is now applied to artillery weapons in bulk, especially to heavy guns. The word preserves its early meaning in the term Ordnance Survey, so called because at first survey was carried out under the *Master-General of Ordnance*, or General in charge of "arrangements."

Ordnance (or cannon) first appeared in battle in England during the Wars of the Roses. Known as *bombards*, the pieces were constructed of wooden staves bound together by iron bands.

As artillery progressed, guns were made of iron bars hammered together when hot round a core of baked clay; bands of hoop-iron were then heated, and shrunk on to the bars by sprinkling water on them; the core was then drilled out. The guns were attached to their carriages by two knobs or *trunnions*.

As the art progressed, guns were cast in brass or iron, and drilled out by special cutting tools. All these guns were muzzle-loaders, fired through a touch-hole near the rear end, by means of a red-hot rod or quick-match, called a *port-fire*; round stones or metal balls were used as projectiles.

As the quality of powder improved and greater range was desired, the bore, or inside of the barrel, was grooved spirally—*rifled*—to allow the use of a heavier shell or projectile, without increasing the size of the gun. The rifling forced the shell to rotate on its larger axis, and thus fly nose foremost.

At first, shells had studs to fit the rifling, and the projectile was forced down spirally from the muzzle with a rammer until it was firmly seated on the powder charge; the invention of the breech-loader allowed a driving band of copper to replace the studs and increased the rate of fire.

Ordnance was soon divided into two types, *guns*, with flat trajectory and great striking power, and *mortars*, which fired their bomb or shell at a high angle; in modern times

appeared the *howitzer*, an improvement on the mortar, but not entirely replacing it.

With the advent of steel, cannon were made in two parts, the "*A*"-tube, to contain the rifling, and the *jacket*, which was placed over the "*A*"-tube when red-hot and shrunk on to it by the application of water or oil.

Even this construction could not stand the terrific power of modern explosives, so the piece (jacket and "*A*"-tube) was wound round with steel wire. The whole was reheated and plunged into an oil bath, which welded its components together. The rifling is next cut out with a tool which will cut accurately to 1/1000 of an inch, since any inequality would cause a burst barrel.

Ordnance is classified as light, field, medium, heavy or super-heavy gun or howitzer, and anti-aircraft artillery. The rapid development of penetrating power in projectiles and increased rate of fire—especially in the mobile anti-aircraft types—has been a feature of recent advances in British ordnance design. See also ARMY, ARTILLERY; also AMMUNITION.

ORDNANCE SURVEY. DEPARTMENT OF Ordnance survey of the British Isles was commenced in 1791, when the Department was founded by the War Office to produce a survey on a scale of 1 in. to the mile. The first sheet was published in 1801, but it was not until 1890 that all parts of the British Isles had been completely surveyed. Since then regular periodical revision of all large and small scale maps has taken place. One-inch scale maps, which are standard in Great Britain, are revised every fifteen years. Conventional signs of an Ordnance map give a clear and accurate indication of all important natural and artificial features of the land. The Survey Department was transferred to the Office of Works in 1870, and to the Board of Agriculture in 1890. A report of the work of the Department is published annually.

ORDOVICIAN, or do vish' ian, PERIOD. The second of the periods comprised in the Palaeozoic Age, succeeding the Cambrian and succeeded by the Silurian Period. It was named from the *Ordovici*, a tribe that inhabited a part of Wales in Roman times. It was formerly called the Lower Silurian. The Ordovician strata consist largely of limestone, but include considerable shale. They are widely distributed in Europe and North America, and have a total thickness of many thousand feet. In some regions, the strata have been greatly deformed and metamorphosed, the rocks having been changed to marble and slate. In other regions, Ordovician beds are the source of oil and gas; and in still others, of lead and zinc ores. The life of the period was abundant

and varied, but it consisted almost entirely of marine invertebrates. Remains of the earliest known vertebrate animals, however, are also found in Ordovician rocks. See **GEOLOGY**.

ÖRE, *ô' rě*. A standard coin of Scandinavia, worth about one-eighth of a penny.

OREADS, *o' re adz*. See **NYMPHS**.

OREGON, *or' re gôn*. A Pacific Coast state of the American Union. It has an area of

Willamette Valley, the chief centre of Oregon's agricultural wealth; it covers over 5,000,000 acres. In the Cascade Mountains, Mount Hood, rising to an elevation of 11,253 ft., is the highest point in the state.

The Columbia River Basin, with the Hood River valley at one end and the Walla Walla valley at the other, is a region devoted largely to fruit and wheat. East and west of the Blue Mountains, which have an elevation



OREGON

Crown Point, overlooking the Columbia River gorge.

Photo U. & U.

96,699 sq miles, and a population (1930) of 953,786. The population is fairly evenly divided between urban and rural districts. Approximately one-third of the state's entire population live in Portland (301,815.) The other cities having over 10,000 inhabitants are Salem, the capital (26,266); Klamath Falls; Medford; and Astoria, the chief seaport, on the Columbia River.

Surface. The Cascade Mountains, crossing the state from north to south, separate it into two distinct regions having widely differing characteristics. In Western Oregon, the western slopes of the Siskiyou and Coast mountains, which do not rise above 4000ft., fall gradually to the sea. Between the Coast Range and the Cascade foothills lies the

of about 8000 ft., are many fertile valleys suited for agriculture and livestock. Central Oregon, east of the Cascades, is a high inland plateau, broken by fertile valleys.

The principal rivers are the great Columbia in the north; the Willamette, rising in the Cascades and flowing north-west and north to the Columbia; and the swift Rogue, Umpqua, and Coquille rivers, which cut their way through the Coast Range to the sea. The Snake River and its tributaries drain the extreme eastern region.

Resources. The most fertile land is in the Willamette Valley; this valley, and those of the Rogue and Hood rivers, are famous for their fruit, especially apples. The well-known Oregon pears, and peaches, nectarines,

plums, cherries and grapes are grown in abundance.

Wheat, oats, barley and other cereals, together with potatoes, are abundantly grown in the Willamette Valley and thrive in the irrigated districts east of the Cascades. Hops are cultivated in Western Oregon.

Sheep outnumber all the other livestock, finding pasture on the more arid plains east of the Cascades. The principal minerals include gold, copper, silver and quartz. In addition there are valuable deposits of jade, iron ore and platinum.

The Owyhee dam is 405 ft. high; another huge dam is at Bonneville.

Manufactures. The large amount of available hydro-electric power, the abundance of raw materials furnished by the forests, farms, fisheries and mines, the improvement of rivers, and the extension of railways are developing Oregon's manufacturing industries. By far the most important of these is the milling and manufacturing of timber products, the largest plant being at Portland and Astoria in the Columbia basin.

Government. The legislature consists of a Senate of thirty members and a house of representatives.

The executive power is vested in a Governor, Secretary of State, and State Treasurer, elected for four years. The Governor may serve only two terms in twelve years.

The judiciary consists of a supreme court, comprising one chief justice and six associate judges, elected for six years; circuit courts, county or probate courts, and justices of the peace.

ORES. The word *ore* is often used for any metalliferous material, but strictly only for that from which the metal can be profitably extracted. Rocks in which ores are found are known in general as ore deposits, and consist of the ore, and waste material or gangue. Ore deposits are found in all parts of the world, in the case of most metals as veins in igneous rocks, though aluminium and iron, the two commonest metals, are not so found. Gold, platinum, and some others occur in a natural state, but most metals are in chemical combination as oxides, sulphates, carbonates or other salts; several metals often occur together.

The purification of ores, and their separation from the gangue, are matters of extreme importance; the latter process, known as ore-dressing, consists of washing, crushing and other milling operations. The actual separation of the pure metal is part of the science of metallurgy (which see). Extraction

of iron ore is a fairly simple process and has been carried out for many centuries; other metals whose ores have long been worked are gold, silver, copper and tin, but aluminium, now so cheap and so important, has only been profitably worked in the last few decades.

ORESTES, *o res' teez*. In Greek mythology, the son of Agamemnon and Clytemnestra. When his father was slain by his mother, Orestes, then a child, was saved by his



Near Tillamook, on the Pacific coast, Oregon.
Photo U. S. G.

sister Electra, who had him placed in the court of his uncle. Here he formed a close friendship with Pylades, the son of the king. His sister Electra had taught him that he should avenge the death of his father, and when finally he came of age, he started out to accomplish this, accompanied only by Pylades. They pretended to be merchants bearing in an urn the ashes of Orestes, and they said, had died, and by this means they obtained access to the palace and killed Clytemnestra and Aegisthus, her lover. In killing his own mother, the Furies pursued Orestes and drove him insane.

Later, the oracles said that if he would bring from Tauri in Scythia a famous statue of Artemis, he would be restored to reason. Pylades and Orestes journeyed to Tauri, whose inhabitants captured them and prepared to sacrifice them to Artemis. The priestess of the temple was Iphigeneia, a sister of Orestes, who had been carried away years before by Artemis, and when brother and sister recognized each other, the safety of the captives was assured. With Iphigeneia's assistance, the statue was obtained. But Orestes was not yet relieved, and taking refuge with Pallas at Athens, he was put on trial, pleading the command of the

Delphic oracle as his excuse. When the vote was taken, a tie resulted, and he was acquitted by the command of Pallas Athene.

ORFORD, EARLS OF. This title is borne by the family of Walpole, which is believed to have been settled in Norfolk before the Conquest, and certainly acquired Houghton Manor in the reign of Henry II. For generations they were country gentlemen living quietly on their estates. Ralph de Walpole was Bishop of Norwich and of Ely in the reign of Edward I, and John Walpole was a famous lawyer in the reign of Edward VI, but these were exceptions. Sir Edward, who voted for the Restoration, and Robert

Walpole were Members of Parliament; they were grandfather and father of the man who became known as the first Prime Minister of Great Britain.

Sir Robert Walpole, first Earl of Orford (1676-1745), was one of England's greatest Ministers of Finance. He was born at Houghton, Norfolk, and studied at Eton and at King's College, Cambridge, with a view to becoming a clergyman, but began a



SIR ROBERT WALPOLE
John Brown Bros.

political career in 1701 with election to Parliament from the family borough of Castle Rising. In the next year, he was returned for King's Lynn, and speedily became known as a distinct force in the ranks of the Whigs. Marlborough and Godolphin, who controlled the administration, soon found their Tory supporters unenthusiastic about the war with France and recruited moderate Whigs. Walpole was in 1705 made a councillor to the Lord High Admiral, George of Denmark. He found affairs in some confusion, but successfully reduced them to order. In 1708 he was made Secretary for War, but two years later went out of office with his party, and became a leading member of the Opposition. His political enemies accused him of corruption and succeeded in having him dismissed from the House and imprisoned in the Tower (1712); but the attack only increased his popularity because, whether true or not, it was obviously a move in the political game, not a real attack on corruption.

When George I came to the throne in 1714, Walpole's prospects brightened. As

Privy Councillor, as Paymaster-General of the Forces, and as Chancellor of the Exchequer, he gained the King's signal favour, and although out of office again in 1717, he continued before the public by reason of his opposition to the South Sea Company. The bubble burst in 1721, and the country was brought to the verge of ruin; but Walpole, again made Chancellor of the Exchequer and First Lord of the Treasury, averted panic and re-established sound finance. From that date until 1742, he was the real ruler of the country, and exerted himself in maintaining peace abroad and commercial prosperity at home.

George I died in 1727, and Walpole's enemies hoped that he would be dismissed, but George II retained his father's Minister, although father and son had been in bitter opposition and Walpole's pacific policy ran counter to the new king's taste for military glory. Walpole, however, had early realized that George, well-meaning but of limited ability, was swayed by his wife, Caroline of Anspach, clear-thinking and intelligent, was attracted by similar qualities in Walpole. They became close friends, and between them they controlled the king. Other politicians had tried to influence George II by winning over his mistress, the Duchess of Suffolk, but they, as Walpole observed, had taken the wrong sow by the ear, he the right. The homely phrase is typical of one who never lost sight of his country interests, and who read his gamekeeper's letters before he opened State dispatches.

One of Walpole's most valuable allies had been his brother-in-law, Lord Townshend, one of the few contemporary politicians to have avoided bribery. Disagreement now arose between them over foreign policy. Townshend beginning to think war inevitable. The Treaty of Seville in 1729 smoothed over international difficulties. Townshend resigned in the next year and Walpole kept control of foreign affairs, finding another lover of peace in the French Minister, Cardinal Fleury. Walpole adjusted the tariff scheme and in 1733 produced an admirable *Excise Bill*, but it raised such a storm of opposition that he withdrew it, he could have forced it through Parliament but to have forced it as law on the country might have led to popular disorders. Walpole's chief opponents were Bolingbroke the Tory, Pulteney the Whig, and, later, Frederick, Prince of Wales, in typically Hanoverian opposition to his father's minister. His foes included some able Parliamentarians, and they were reinforced by a body of younger men styled, sometimes euphemistically, the "Young Patriots." Of these, far the ablest was William Pitt, later Earl

of Chatham. Another opponent was William Shippers, leader of the Parliamentary Jacobites. Walpole met his opponents with great debating skill, and kept a majority by carefully organized bribery. He did not corrupt political life, for that had been done already, but he used with cheerful realism the weapon he found to hand. His chief supporters were the Duke of Newcastle and Stanhope.

In 1737 Queen Caroline died. From that time, opposition to him and to his policies grew steadily, and there were several times when his defeat was expected. In February, 1742, he was raised to the peerage as Earl of Orford; a few days later, he resigned his office, though George II continued to consult him on all important questions. Shortly before this, he had been forced to consent to war with Spain. England claimed, on no good grounds, the right to trade with Spanish America, and a storm of indignation swept the country when a certain Captain Jenkins complained that Spanish officials had cropped his ear on a baseless charge of smuggling. It is probable that he had in fact lost his ear on the pillory for some offence. National excitement was so great that the *War of Jenkin's Ear* began, and Walpole's fall was caused by the suspicion that he was lacking in patriotic zeal.

Again, in his old age, Walpole was accused of bribery, but the charges, as far as he personally was concerned, were false. He did, it is true, openly justify Parliamentary corruption, not as desirable, but as necessary, but he proved his own uprightness by leaving office poorer than when he entered it. The general prosperity caused by his rule of peace had been of the utmost material benefit to the country.

Horace, or Horatio, Walpole, fourth Earl of Orford (1717-1797), was the fifth and youngest son of the statesman described above. He was born in London, and after education at Eton and Cambridge, he spent several years in travel on the Continent. On his return in 1741, he entered Parliament. He retained his seat until 1768, though never pretending to have any real interest in politics. His home at Twickenham, which he christened Strawberry Hill, was famous for the collection of antiques which he had gathered there, and was often visited by tourists. In 1764 he published *The Castle of Otranto*, an exaggerated tale of mystery, which became very popular and was widely imitated. A tragedy on a similar theme, *The Mysterious Mother*, followed in 1768. His work as a biographer and historian reveals careful study, particularly his *Historical Doubts on the Life and Reign of Richard III*, published in 1760.

It is not on any of the above, however,

that Walpole's fame chiefly rests, but on his *Letters*, which entitle him to a place among the foremost English letter-writers. Though he could picture most entertainingly the society of his day, he was by no means careful about telling the truth, and the historic value of the *Letters* is thus lessened. Walpole set up a private printing-press on which he printed his own works. He set the fashion of building stucco-covered, battlemented houses, in imitation of medieval castles, of no very definite period. This style is known as "Strawberry Hill Gothic."

The present Earl of Orford is descended from Horatio, first Baron Walpole of Wollerton (1678-1757), the elder brother of the great minister, who was not deterred by accusations of jobbery from assisting his brother's career. Horatio held a long succession of posts of importance, if not of first-rate importance. His nephew and namesake speaks sneeringly of his ability; but it is noteworthy that he was still used after his brother's fall and death.

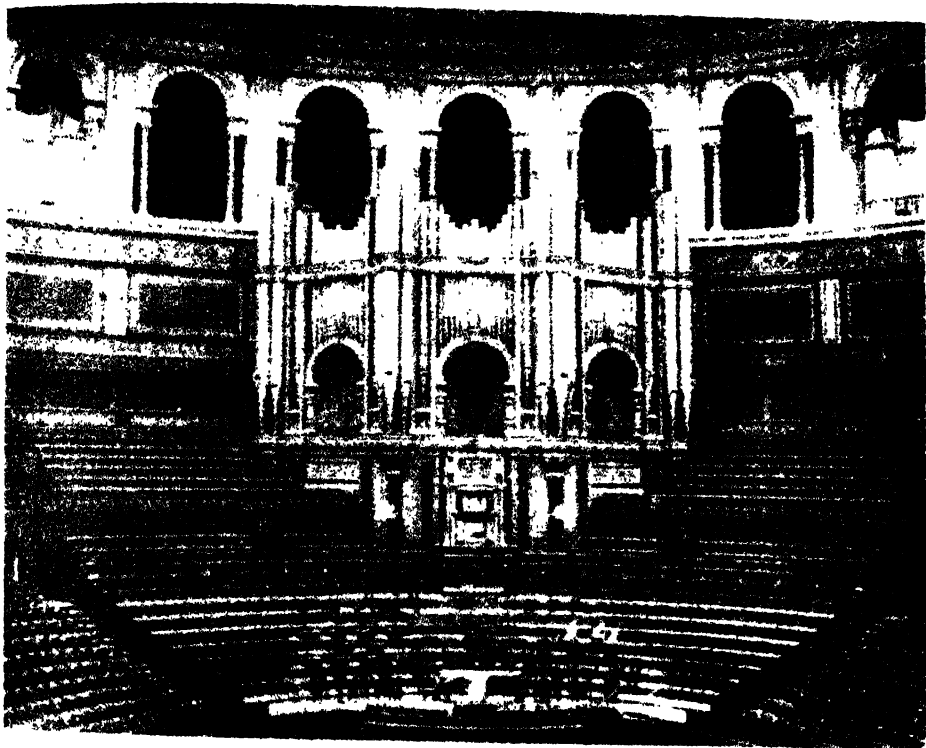
ORGAN. The essential parts of an organ are the pipes in which sound is set up, the means of supplying wind to those pipes, and the means of directing wind to the desired pipes while withholding it from those not required. These three essentials have existed from very early times. Their principle no doubt originated in the well-known "Pan's Pipes," a series of tubes of varying length, held at will to the lips of the player. The next step was to place a wind-box beneath the tubes, supplied with wind from a single separate tube to the mouth, the sounding tubes being then covered or uncovered with the fingers. A further development was to add a series of slides between the wind-box and the sounding tubes, so arranged that the notes of the organ could be played by pulling or pushing the slides as desired.

With the object of effecting a steady supply of air in place of the intermittent flow of the human lungs, the so-called "Hydraulic Organ" was invented by Ctesibius, an Egyptian of the third century B.C. It differs from the "Pneumatic Organ" in having a water-chamber, containing an inverted open bowl into which the air was supplied, and from which it passed again to the pipes by means of two tubes from above. The pressure of the water, attempting to enter the bowl from below, ensured that the pressure of air leaving the bowl and entering the pipes should be even, no matter if the original source of the air-supply should be irregular. The Hydraulic Organ continued in use until the end of the thirteenth century A.D., but the normal pneumatic type was never superseded and eventually prevailed.

By the end of the eleventh century A.D., if not earlier, a keyboard had been added to the organ. It was at first very large and clumsy, being gradually reduced in size to more manageable proportions. At the same time, the principle of uniting several complete sets of pipes was developed to an increasing degree. At first, each key caused all the pipes tuned to a given note to sound simultaneously. Later two or three manual-

variations of these three types, further variety to an almost unlimited degree being produced by alterations in the material, calibre, proportions, form and "voicing" of the pipe.

The invention of the organ was now completed. Enormous though the practical modifications of modern times have been, they have all worked upon the basis established by the end of the fifteenth century. Until about 1800, no very radical alteration



THE ORIGINAL ORGAN (1871) AT THE ALBERT HALL

Photo: Willis

keyboards, and a pedal-keyboard in addition, came to be constructed, and by the fifteenth century a device for separating the sets of pipes from each other by means of master-slides or "stops" was developed, and variety of colour was introduced by making these sets of pipes upon different principles.

There are three main forms of tone produced by the setting up of vibrations in a column of air contained in a pipe. The pipe may be "open," so that wind passes right through it. If the same pipe has a closed end, it is a "stopped" pipe, sounding at a much lower pitch. Finally, a vibrating "reed" may be introduced at the blown end of the pipe, giving a more nasal type of tone ("reed" pipe). All organ pipes are

took place. For perhaps three hundred years, a complete and beautiful form of the organ continued to flourish. It ranged from the very popular small "chamber organ," comprising a single set of stopped wooden pipes of pure and attractive tone, which played a great part in the music-making of the sixteenth and seventeenth centuries, to the great organ of St. Gervais in Paris on which Couperin played, with its five manuals and pedal keyboard. In between were the rather smaller church organs; and the more elaborate chamber organs with perhaps four stops, but still contained within a movable case not above 5 or 6 ft. long. There is some very characteristic seventeenth-century music in which the chamber organ plays an

essential part, such as the suites for violin, viola da gamba and organ of William Lawes and John Jenkins; and it must also be remembered that the organ music of J. S. Bach and his contemporaries was intended for an organ of this period, of much more sensitive tone than that of the modern organ.

The organ of the period we have just described was without mechanical devices assisting in the controlling of the valves. The energy required to overcome the pressure exerted by the air waiting to enter the pipes, had to be supplied by the fingers of the player. In the small chamber organ, or in playing upon one or two stops only of the larger organs, this energy was negligible, and did not interfere with the delicacy of the touch, which was equal to the fastest movements of which the fingers are capable. When a number of stops were in use together, it was arranged that their valves should open not absolutely simultaneously, but in quick succession. To the ear it is impossible to detect the difference; but since the pressure exerted by the air ceases so soon as the valve is opened by the least crack, the energy required to overcome it was thus reduced to very manageable proportions. This is the secret of the old organ touch, but it must again be remembered that all old organs are designed for a comparatively low wind pressure; their charm depends on it; nor, since its source was man-power, could it be increased beyond a certain limit. Nevertheless, a full organ of the St. Gervais class, when played with all the stops in use, became somewhat stiff in touch. About 1850, devices, pneumatic and electrical, were thought of for supplying mechanically the energy required to manipulate the keys. Since increase in wind-pressure then became no longer an obstacle to a delicate touch, the invention of mechanical blowing apparatus was the natural corollary. With these inventions, the character of the organ has become radically changed. Wind-pressure has been consistently increased. Power and variety have been indefinitely enlarged, but at a sacrifice of character and beauty of tone which has, for many musical people, lent the modern organ a somewhat unsympathetic quality.

The Modern Organ. In order to appreciate the changes that have taken place in the construction of the modern organ, it is necessary to understand the general principles on which it operates. The main parts are the keyboard, the valve mechanism, the pipe assembly, and the blower. When a key is pressed, it makes a contact which transmits an electrical impulse to the valve mechanism. This valve mechanism is so designed that it transforms the electric impulse into a

pneumatic one. The pneumatic impulse opens a valve which admits an under-pressure to the pipes. The air is supplied from a wind chest, which in turn is filled by the blower. The latter consists of a fan driven by an electric motor.

Electric transmission ensures immediate response because the impulses are transmitted instantaneously. Another advantage is that the keyboard may be placed at almost any distance from the organ itself, and it is not necessary to locate all the parts in one place.

But the player has no longer that control



REBUILDING THE ORGAN AT
ALEXANDRA PALACE
Photo Willis

over the character of the note by means of his touch, which the old organ possessed, in common with all other keyboard instruments. The touch is purely mechanical and insensitive; expressiveness must be sought by other means. Of no other musical instrument has this to be said. It will be seen that phrasing by means of the silences between notes—always an important factor in musical expression—becomes of redoubled importance upon the modern organ.

The keyboard is contained in a case called a *console*. There are usually several rows of keys, sometimes as many as six. These are called *manuals* because they are played with the hands. They divide the organ into divisions, which, in the case of a

six manual organ, would be as follows: the great organ, the swell organ, the choir organ, the solo organ, the bombarde, and the echo organ. On account of the coupling system in modern organs, all the separate divisions can be collected together on the great keyboard, or different combinations of divisions can be made on any of the other keyboards. There is also a pedal organ, played with the feet by means of the large wooden keys at the base of the console.

The stop knobs, which are placed at the sides of the keyboard, control particular sets of pipes. When they are drawn, they

The valve mechanism is that part of the action which changes an electric into a pneumatic impulse. The ways in which this is accomplished differ in the various makes of organs. The technical details of good valve design need not be discussed here, but whatever the design, the utmost reliability is essential to the satisfactory operation of the action.

The organ pipes are usually enclosed in a pipe chamber. Those which are generally visible in a church or auditorium are seldom used for tone production. They are employed for their decorative effect. The pipe chamber is entirely enclosed, and has one or more



ORGANS

Five-manual organ, City Hall, Brisbane, and the famous organ at St. George's Hall, Liverpool

Photos: Willis

connect the pipes which they control with the keyboard.

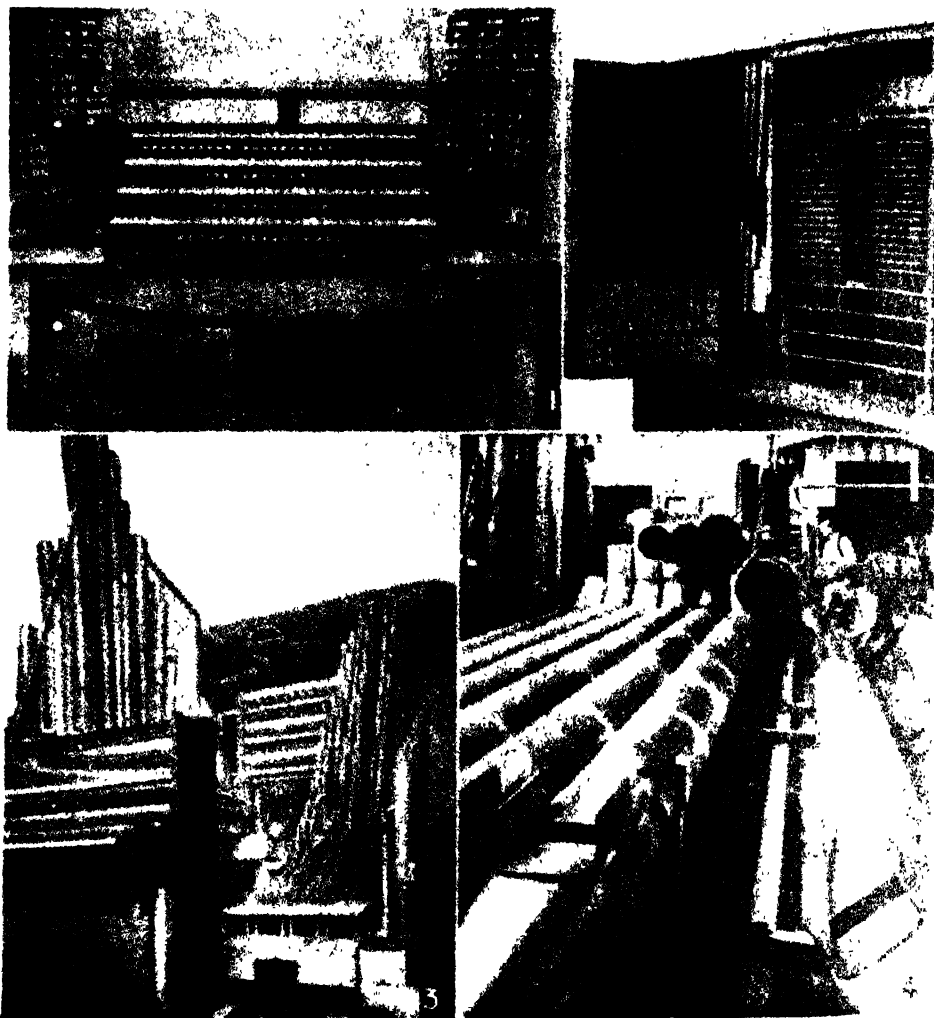
Two features of keyboard arrangement on some organs, particularly those of the theatre, add greatly to the ease of playing. The keys make one set of contacts when pressed only halfway down. This is called *first touch*. They make another set of contacts when pressed all the way down; this is *second touch*. By this means, the number of possible uses for each key is practically doubled.

Another ingenious device, found on all organs, is the combination action, or multiple stop control. By pressing one of the buttons immediately below the keys, the organist can bring into use a prearranged group of stops without having to manipulate each stop separately. These two devices greatly aid in producing the vast number of effects possible with the largest organs.

openings controlled by swell shutters, which can be opened or closed to control the volume of the sound. Sound may be admitted directly into the audience room or conducted a short distance through a sound chamber.

The pipes composing an ordinary organ stop vary in length from about 32 ft to 3 in., the length being in exact proportion to the pitch of tone desired. A loud- and firm-toned pipe requires firm walls, so that it may resist any tendency to vibrate in sympathy with the tone which it generates. Pipes of softer and complex tone, on the other hand, have requirements of an opposite kind, and for them thin walls are preferable.

Before pipes are put into an organ, they are "voiced," that is, adjusted to produce their proper tones. Each stop or group of pipes is voiced separately, but the tones must be matched with those of all the other



ORGAN BUILDING

1. Console of organ at Broadcasting House. 2. Relay unit of two-manual organ. 3. Piano and traps unit in cinema organ; the piano is playable from the console. 4. Contra violines, 37 ft. 10 in. from the organ of St. Paul's Cathedral.

Photos: Compton; Willis

stops. Skilful voicing is one of the greatest factors in producing excellence of tone in an organ.

Each set of pipes rests on a wind chest, which is a wooden box with holes bored in it for the admission of air to the pipes. The air is maintained under pressure in this box by means of the blower. In order to provide a uniform pressure, an air reservoir is provided between the blower and the wind chest. This takes the form of a box with a movable top regulated by springs. It receives the wind from the blower and passes it on

to the wind chest, meanwhile maintaining the desired pressure.

The size of organs varies greatly. The smallest organ contains about 3 pipes, while the largest in the world actually has more than 40,000 pipes.

Obviously, the size of an organ largely determines the range of effects which it can produce.

Reproducing mechanism has been devised which makes possible the playing of the organ by means of music rolls, similar to those used on the player piano.

ORGANIC CHEMISTRY. A term formerly applied to the study of compounds produced in living matter; now denoting the chemistry of carbon compounds. See CHEMISTRY.

ORGANISM. See BIOLOGY; CELL.

ORGAN OF CORTI. See EAR.

ORGANZINE, or' gan zeen. See SILK.

ORIEL, or' iel, WINDOW. A window built out from a wall and supported from the ground or by a bracket. The oriel is often placed in an upper story, and has three sides, divided by mullions into bays. It was common in medieval and Elizabethan architecture. The name at one time denoted a gallery or balcony; later, it was applied to a private room looking into a chapel. Older writers called it a *bay window*.

ORIENTATION. Turning or facing the east. Generally, but not universally, Catholic and Anglican churches are built so that when mass or communion is being celebrated, the priest or minister faces east. Ancient Grecian temples were frequently built facing the rising sun. The word is also used to denote direction, or change of direction.

ORIFLAMME, or' i flam. The banner of St. Denis, patron saint of France, which later became the principal banner of the kingdom. It was an oblong, red streamer, cut into three points, tipped with green feathers, and suspended from a golden lance. During French history, it was received by the king from the Abbot of St. Denis, to be carried before them as they set out for battle. Louis VI, the Fat (1081-1137), received the ensign with great solemnity, kneeling, unclothed, and with bare head. The sacred ensign became the insignia of France for a number of years, and was used for the last time at the Battle of Agincourt in 1415.

ORIGEN, or' i jen (185-254) A Father of the Church, writer and distinguished theologian, who resided mainly at Alexandria. While on a visit to Palestine, he was subjected to orders by the local bishop, greatly to the annoyance of the Bishop of Caesarea, who, at a special synod, deprived him of his office and declared his banishment from Alexandria. For twenty years following his banishment, Origen wrote and taught at Caesarea in Palestine. He is said to have written six thousand treatises, the most important of which are the *De Principiis* and a *Commentary of St. John*. He taught that the Scriptures had a higher spiritual meaning as well as the literal meaning. He brought an enlightened philosophy to the Church and had a far-reaching influence on its leaders, in spite of the attacks that were made upon him.

ORINO'CO, River. The third greatest river of South America. From its source in the Parima Highlands in Venezuela, near the

boundary between that country and Brazil, it flows in a north-westerly direction until it reaches the Colombia boundary, and then turns northward, forming the frontier between Venezuela and Colombia. It finally swings east, making its way to the Atlantic Ocean through a great delta 7000 sq. miles in area. Its length is about 1500 miles, and at flood season, in the spring, it sometimes spreads out to a width of a hundred miles. The Casiquiare, which branches from the river after the first 150 miles from the source, carries with it one-sixth the volume of the Orinoco and flows into the Rio Negro, an affluent of the Amazon.

It is not an important commercial highway, because much of its course lies in a densely forested region that is but sparsely inhabited. Ciudad Bolivar, 260 miles from the Atlantic, is the centre of the river trade, and there is steamship traffic between this town and Trinidad during most of the year.

The first known European expedition to the Orinoco was that of Oudart in 1571.

ORIOLE, or' i ol. In the Old World, the name is given to a family of orange- and black birds, related to the crows.

The American oriole is a different type, a sub-family in the third family.

The golden oriole is the only species found in Britain. This is conspicuous for its yellow and black plumage and migrates to England in the summer. It is common in Southern Europe during the same season, but returns south of the Equator during the winter.



BALTIMORE ORIOLE
Photo: Visual Education Service

Scientific Names. The European golden oriole is *Oriolus oriolus* of the family *Oriolidae*. The American orioles belong to the family *Icteridae*.

ORION, *o ri' on*. In Greek mythology, son of Hyrieus, and a hunter famous for his strength and beauty. He fell in love with Merope, the daughter of Oenopion, king of Chios, and to win her favour, he cleared the land of wild beasts with the aid of Artemis. But her father would not consent to the marriage, and Orion attempted to take Merope by force. This act so angered Oenopion that he caused Orion to become drunk, blinded him, and cast him out. Orion was able to reach the Cyclops' forge by following the sound of the hammer blows. From here, led by a messenger of Hephaestus, he reached the rising sun, by whose rays his sight was restored.

Orion returned to hunting and became a favourite of Artemis. Her brother Apollo, disapproving, plotted his death. One day, when Orion was swimming in the water, Apollo spied the black spot made by his head bobbing up and down in the water, and challenged his sister to hit that target in the sea. Her marksmanship was perfect, but when she found that it was her lover she had killed, she placed him among the stars as a giant and hunter, followed by his dog Sirius. The Pleiades, daughters of Atlas and nymphs of Artemis, fled before him, but he pursued them until Zeus turned them into pigeons, and later made them a constellation in the sky. See **PLEIADES**.

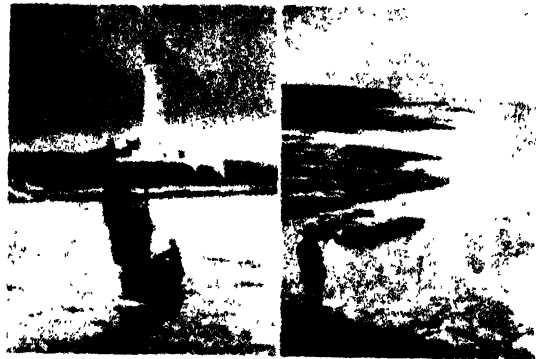
ORION. In astronomy, a large and brilliant constellation, most conspicuous of all in the winter sky in the British Isles. It contains three bright stars, Betelgeux, Rigel and Bellatrix, and four of lesser magnitude which form Orion's "belt" and "sword," with many less bright, as well as a vast spiral nebula which is believed to involve the whole system, forming a unit complete in itself. See **ASTRONOMY**; **STAR**.

ORISSA. A province of India constituted in 1936. Until that year it had formed one province in union with Bihar (which see).

ORKNEY ISLANDS. A group of islands, said to have been discovered by Agricola, separated from the north of Scotland by the Pentland Firth. Thirty of the islands are inhabited, the total number of the group being sixty-seven, exclusive of a number of rocky islets. The principal islands are Pomona or Mainland, Hoy, North and South Ronaldshay, Flotta, Burray, Rousay, Shapinsay, Stronsay, Eday, Westray, and Sanday. The total area is 375 square miles. Pomona and Hoy are hilly; on the coast of the latter isle is the "Old Man of Hoy"—

a sandstone pillar rising to a height of 450 ft. The remainder of the islands lie somewhat low, with a bleak aspect on account of the lack of trees. The islands are in communication by steamer with the mainland.

The climate is mild, owing to warm ocean currents; the soil fertile, producing barley, oats, turnips, and potatoes. Livestock, poultry, eggs and fish are exported. The only important towns on the islands are Kirkwall, the capital, and Stromness on the island of Pomona. During the long days of summer, the sun rises so early and sets so



ORKNEYS

Graemsey lighthouse (left) and the site of the Kildar Memorial

late that darkness is practically unknown at that period. The winter days, however, are correspondingly short and dark.

In early times, the Celts probably occupied the islands. Norsemen visited them often. In the tenth century, independent Scandinavian earls ruled. In 1048 the Norwegian Crown assumed control, and the feudal lords were succeeded by Scottish nobles.

The Orkney Islands were finally acquired by Scotland in 1590. They were previously held as security for the dowry of Margaret, daughter of the King of Denmark, when she married King James III of Scotland. The dowry was not paid, so the islands were released instead. The inhabitants are largely of Scandinavian descent, and the total population numbers 22,075.

During the World War, the islands became an important naval base on account of the extensive operations in the North Sea. Scapa Flow, a strait or sound south of Pomona, was the headquarters of the Grand Fleet.

ORLANDO, VICTOR EMMANUEL (born 1860). Signor Orlando, a distinguished Italian statesman of the Left, first became a delegate in 1898. He subsequently held various offices, including the portfolios of

Education, Justice and the Interior. In 1917 he became Premier and practically dictator; his courage revived the nation after the disaster at Caporetto. In 1919 he was one of the "Big Four" at the Peace Conference, but his influence with his colleagues was obviously weakening, and the difficulties over Fiume caused him to resign, becoming Ambassador to Brazil. He at first showed some sympathy with Fascism, but in 1925 he retired from politics.

ORLEANISTS. A political party which for eighteen years (1830-1848) governed France, not unsuccessfully. Its natural leaders were the descendants of the younger brother of Louis XIV (the Bourbon-Orleans family from which the party name was derived). The difference between the Orleanist and the Legitimist Royalists was that while the latter believed in the divine right of kings the former sought to reconcile the monarchy with the "rights of man" declaration of the Constituent Assembly in 1789. When the Orleanist Louis Philippe was proclaimed king it was not as "King of France and Navarre by the grace of God," but as "King of the French by the grace of God and the will of the people."

Revolution brought the Orleanists into power and revolution ousted them. The cause of their fall was the electoral system that they set up. Under this system only about 250,000 persons had the right to vote, and it was claimed that the rest of the country was "virtually represented" by the voting element. The privileged governing class so created was resented. Through the ability of individual leaders, the Orleanists continued to exert influence for some thirty-five years after their fall from power, but, in 1873, a fusion was arranged between the comte de Paris (Orleanist) and the comte de Chambord (Legitimist), which led to the supposition that the Orleanists had been absorbed by the Royalists believing in divine right, and so the party ceased to function as an independent organization.

ORLEANS (in French, *or leh ahN'*). See FRANCE.

ORLEANS, DUKES OF. The name adopted by two branches of a royal French family. These branches were known respectively as the House of Valois-Orleans and the House of Bourbon-Orleans. See **BOURBON**.

The title of Duke of Orleans was first bestowed on Philip, the fifth son of Philip VI of France, in 1344. He died without an heir, and in 1392 the title went to Louis, Count of Valois and younger son of Charles V. Louis was therefore founder of the House of Valois-Orleans. He played an important part in the history of his time, and became a claimant for the throne when Charles VI,

his elder brother, became insane, and his uncle, Philip of Burgundy, was conducting the government. This circumstance, coupled with Louis' extravagance and licentiousness, culminated in his assassination.

The next Duke of Orleans was Louis' eldest son, Charles (1391-1465). He fought at Agincourt, was captured, and held prisoner in England for twenty-five years. He was a poet of distinction and a patron of the arts. His son, Louis XII, was the first member of the Valois-Orleans branch to ascend the throne. The Duchy was united with the crown, and this family occupied the throne until the death of Henry III in 1589; during that period, the title of Duke of Orleans lapsed.

Philippe (1640-1701), founder of the Orleans-Bourbon branch of the family, was the only brother of the "Grand Monarque," Louis XIV. He was created Duke of Orleans in 1661, the same year in which he was married to Henrietta Anna of England, a sister of Charles II.

Philippe (1674-1723), Duke of Orleans, was the son of the foregoing. Until Louis XV reached his majority, the duke acted as regent of France. In this capacity, he permitted his extravagant and dissolute habits to overshadow his really brilliant talent for statecraft; and by recklessly introducing a large amount of paper currency he nearly brought the country to a condition of bankruptcy.

Louis Philippe Joseph (1747-1793), fifth Duke, was known as Philippe Egalité. This name he assumed in 1792, during the French Revolution, to signify that he was on the side of the people and opposed to the court party. Though he voted for the death of Louis XVI, he was not trusted by the Revolutionary party, and in 1793 was arrested with the other members of the Bourbon family, and beheaded. The Louis Philippe who became "Citizen"

King of France in 1830 was his son. Louis Philippe's eldest son, Ferdinand, assumed the title Duke of Orleans when his father acquired the throne, and members of the family retained the title.

Louis Philippe [Robert] (1869-1926), grandson of Ferdinand and last legitimate



PHILIPPE ÉGALITÉ

pretender to the throne of France, was born in England, and though educated in France, he was exiled from there in 1886. When he became of age, he offered himself for military service in France, but he was arrested and imprisoned for two years for returning after being exiled. At the beginning of the World War, he again presented himself for service to France, but was prevented by law from being accepted. He also tried to serve England, Russia, Italy and Belgium, all of which refused his services, not wishing to offend France. He died at Palermo, 28th March, 1926.

ORMAZD, *or' mizd*. See ZOROASTER.

ORMONDE, DUKES OF. The ancient house of Butler traces back to Theobald Walter, Butler of Ireland, brother to Henry II's minister Hubert Walter.

James Butler, first Duke (d. 1688), as a young man ventured to oppose the great

against the Dutch in 1673. Ossory died in 1680, and Ormonde was succeeded by his grandson.

James Butler, second Duke (d. 1745), supported the Revolution of 1688 and fought under William III at the Boyne and Landen. In 1702 he commanded the troops in the not entirely glorious raid on Vigo. The chief soldier of the Tory party, he replaced Marlborough as Captain-General when the Tories triumphed. He became a Jacobite, but he achieved nothing at the critical moment of Anne's death or in 1719.

ORMSBY-GORE, RT. HON. WILLIAM GEORGE (born 1885). Educated at Eton and New College, Oxon., eldest son of Lord Bute. He held a commission through the World War; was on active service in Egypt, Intelligence Officer on the Arab Bureau, and Assistant Secretary to the War Cabinet. After serving as a political officer in Palestine, he was Colonial Secretary from 1922 to 1929, except for the period of Socialist government in 1924. He became Postmaster-General in 1931 and then First Commissioner of Works. He has been a Member of Parliament since 1910, first for Devon and then for Stafford. He is President of the Zoological Association, and a member of the councils of several of the national galleries and museums. In March 1932 he again became Colonial Secretary on the resignation of Mr. J. H. Thomas.



RT. HON. WILLIAM GEORGE ORMSBY-GORE



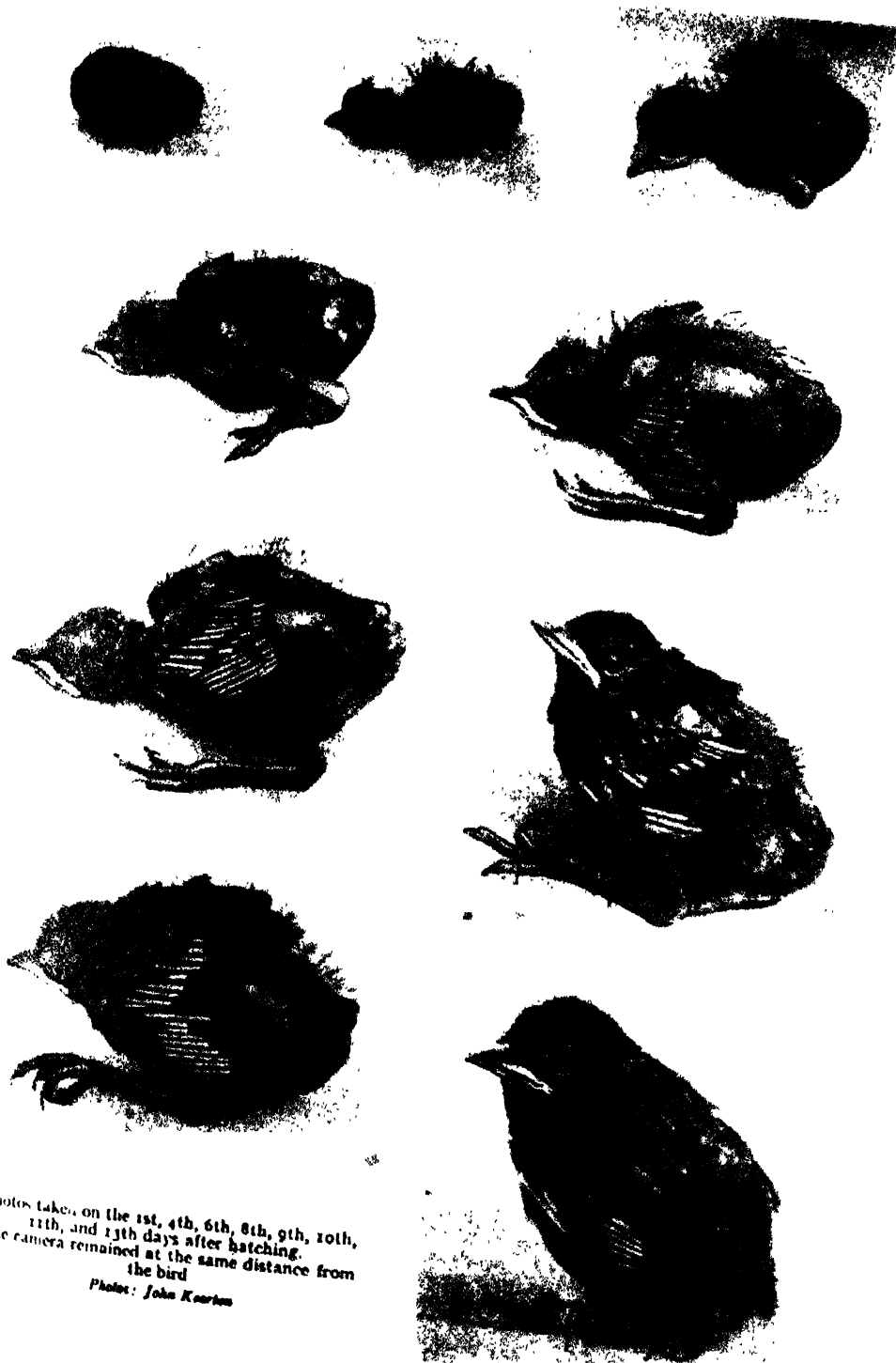
FIRST DUKE OF ORMONDE
(National Portrait Gallery)

Viceroy Strafford, whose devoted supporter he later became. He was appointed Lord-Lieutenant of Ireland, but shared the exile of the younger Charles; he was a close friend of Lord Clarendon. At the Restoration he was created a Duke and again sent to govern Ireland, which he held loyally for the king, although Shaftesbury's party fought hard for his dismissal. He was a man of courage, wit and considerable charm, characteristics shared by his son Thomas, Earl of Ossory, who fought

ORNITHOLOGY. The name applied to the branch of zoology that relates to the study of birds, their habits, description and relation to man. The study of ornithology is commonly said to date from the time of Aristotle, but the foundations of the modern scientific development of the subject date from the end of the seventeenth century, when Ray and Willughby's *Ornithologia* appeared, with a classification of birds into two large groups, land birds and water birds, divisions which were used for 200 years. In 1817 Cuvier's classification superseded it, and continued to be accepted to the end of the nineteenth century.

In 1867 Huxley published his paper on *Classification of Birds*. This was followed by several other schemes, none of which have

GROWTH OF A BLACKBIRD



Photos taken on the 1st, 4th, 6th, 8th, 9th, 10th, 11th, and 13th days after hatching. The camera remained at the same distance from the bird.

Photo: John Kearton



GROWTH OF A BLACKBIRD

Fourteen days after hatching, the bird is ready to leave the nest.

Photo: John Kearton

proved satisfactory, mainly because all birds have so many characteristics in common. See BIRD.

ORPEN, SIR WILLIAM (1875-1931). A well-known British artist, born in Dublin and educated first at the Metropolitan School of Art in that city and later at the Slade School, London. His earlier works were chiefly interiors and subject paintings,



SIR WILLIAM ORPEN

Photo: Topical

and becoming associated with the New English Art Club he exhibited there in 1899. During the World War, Orpen was appointed official artist, and his brilliant war pictures were exhibited in 1918. In that year he was knighted and the following year elected a Royal Academician. His later work as a portraitist increased his reputation. Among his best portraits are "Lady Orpen" and "Dame Madge Kendal," both in the Tate Gallery. Other paintings in this collection are "The Angler," "Sir William McCormick," and "The Model," the latter a fine example of his work in water-colour.

ORPHANAGES, or FOUNDLING HOSPITALS. Institutions for children whose

parents are dead, or who are abandoned by their parents; often organized as schools. They provide various types of educational training.

ORPHEUS. A musician and poet celebrated in Greek myth, the son of Oeagrus and Calliope. On the voyage of the Argonauts, the music of his lyre made the ship glide smoothly through the water.

Hymen neglected to bless the nuptials of Orpheus and Eurydice, and shortly after the marriage, Eurydice was bitten in the foot by a snake and died. Orpheus mourned and resolved to seek his wife. When he descended into Hades, Cerberus forgot to growl, the wheel of Ixion stopped, Tantalus ceased trying to slake his burning thirst, Sisyphus rested on his rock, and Pluto and Persephone were charmed into letting Eurydice go, on condition that Orpheus should lead his wife to the upper regions and not look back until they reached the world of the living. As they were about to come into the earth regions, Orpheus forgot the stipulation, as he stretched out his arms to embrace Eurydice she was snatched from him.

One day, as he wandered disconsolately through the woods, he was met by a group of Bacchantes who were determined to capture



ORPHEUS AND EURYDICE

him. When he resisted, they threw missiles at him, which fell harmlessly about him, charmed by the music of his lyre. Then the women drowned his music by their screams, and he was killed. The crazed maidens tore his body in pieces, and hurled his head and lyre into the River Hebrus, where they murmured sad music as they floated down the stream.

ORRERY, ROGER BOYLE, FIRST EARL OF (1621-1679). A writer of some historical importance, who introduced rhymed tragedies to the English theatre, but whose chief title to fame is his enormous romance, *Parthenissa*, published in six volumes. This rambling narrative is almost the sole English example of the heroic romance which was so popular in French literature of the seventeenth century. The fourth Earl invented the *orrery*, a kind of planetarium (which see).

ORRIS ROOT. A corruption of *iris root*, the name of the underground stems of various species of the European iris. The plant chiefly cultivated for commercial purposes is *Iris florentina*, and the industry is carried on chiefly around Florence. In August the underground stems are dug, scraped, freed of small rootlets, slowly dried, and packed. The dried root has a faint odour like that of violets, and is used in the manufacture of tooth powders.

ORSINI. *or se' ne.* The name of a wealthy and influential family of Rome, several members of which were Popes. Among the most notable of these was Giovanni Gaetano Orsini, who became Pope in 1277 under the name Nicholas III. Others attained distinction as statesmen and generals. The Orsini rose to prominence in the twelfth century, and were the hereditary enemies of the Colonna family. They later divided into seven branches, the only one surviving being that established in Naples by Francesco, Duke of Gravina.

ORTHOCERAS, *or thos' er as.* A family of shelled animals that inhabited the seas in past geological ages. The animals of this group had a shell somewhat like that of the nautilus, but straight instead of curved. In the interior were a series of chambers, separated from one another by cross partitions, and each dividing wall had a small opening in the centre. Fossils of about 200 species have been found, varying greatly in size.

ORTHOCLASE, *or' tho clays.* Crystalline feldspar, a constituent of granite; in colour usually creamy-white to pinkish. See **FELDSPAR**.

ORTHODOX CHURCH. This is the name for the vast body of Christians, said to number over a hundred millions, in the East of Europe, Egypt and Asia, who hold that their Communion is the one true Church of Christ, and repudiate the claims of Rome, from whom they separated themselves in the eleventh century, owing to doctrinal and political dissensions between East and West.

The Orthodox Eastern Church, as it is properly called, though it is often popularly named the Greek Church, consists of a

number of self-governing churches of which the chief are the Oecumenical Patriarchate of Constantinople, and the Patriarchates of Alexandria, Antioch and Jerusalem. Added to these are the Archiepiscopate of Cyprus, and a number of national churches attached to the Orthodox Communion, of which the principal are the Churches of Russia, Greece, Rumania, Bulgaria and Yugoslavia.

The chief characteristic of the Eastern Church is an intense conservatism. Tradition holds the strongest sway over it, a fact which contributes to elements in it both of strength and weakness. It has no "visible head," such as is acknowledged by the Western Latin Church in the person of the Pope, and no member is regarded as infallible. It rests on the authority of the seven Oecumenical Councils, from the first Council of Nicaea (325) to the second Council of Nicaea (787). Its creed is the Oecumenical Creed of Nicaea, commonly called the Nicene, with the exception, vital according to Eastern theology, of the addition made in the West of the words "And from the Son" to the words "proceedeth from the Father" in the clause in the Creed concerning the Holy Ghost. The dispute about this addition, the *filioque clause* as it is called, was the ostensible cause of the final break between Constantinople and Rome, and still remains a cause of division, but the real reasons went much deeper in political jealousy and racial misunderstanding.

Ritual. The services of the Orthodox Church are extremely elaborate, and accompanied with much ceremony. The worship of the congregations finds its object in the celebration of the Eucharist, and the Liturgies, of which there are two in use, those of Saint Basil and Saint Chrysostom, are performed with great pomp. The singing is unaccompanied, the people stand for worship, preaching is not much practised and no images are allowed. But pictures of Christ and of the Saints, called "Eikons" are in frequent use. No crucifix is permitted to have a raised image, but the figure of Christ can be painted on the cross. Divergences from the practice of the Latin Church are found in the giving of Communion in both kinds, baptism always by immersion, and the confirmation of newly baptized persons by the priest immediately after baptism. A regular synodical system regulates ecclesiastical affairs. Monasticism is largely practised under two rules—those of Saint Antony the Eremite and of Saint Basil the Great, and is of great importance in the polity of the Church because all bishops are chosen from the ranks of the monastic clergy.

ORTHOGRAPHY, or *thog' ra fe*. A term derived from the Greek for "correct writing," applied to the use of standard or accepted spelling. Orthography is closely related to speech, and the study of one necessarily involves the study of the other. Since writing is an effort to represent speech, spelling should depend on pronunciation. In English, however, discrepancies between speech and spelling are frequent, and for this there are several reasons. One of these is the inadequacy of the alphabet, or lack of letters to represent the various sounds accurately; another is redundancy, or the use of two or more letters for the same sound. In addition, there is the occasional change in pronunciation. Writing is always many years behind speech: it is conservative, whereas speech adopts quickly whatever is simplest and most expressive. See LANGUAGE.

ORTHOPAEDICS, or *tho pe' diks*. Term denoting the branch of surgery which deals with injuries, diseases, and deformities of bones and joints. Though etymologically the word refers to children (Greek *orthos*, straight, *païdos*, child), it applies to treatment at all ages.

Injuries. Fractures of bones and dislocations of joints may occur in any of these structures in any degree of severity, from fracture of the base of the skull, or dislocation of one of the vertebrae of the neck, either of which may cause immediate death, to a dislocated finger which may be replaced on the spot and leave only a little soreness and stiffness for a few days. This branch of surgery was revolutionized by the introduction of radiography at the end of the last century, and the knowledge thus gained was implemented by work done during and after the World War. In the early days of the War, for example, 80 per cent of compound fractures of the thigh bone were fatal, but by 1917 this had been reduced to 25 per cent.

Diseases of bones and joints, notably tuberculosis, rickets, inflammations and various forms of arthritis, are potent causes of crippling deformities, even after the original diseases are cured; but considerable progress is being made in methods of treatment.

Congenital deformities, such as club foot and supernumerary fingers, also fall within the province of the orthopaedic surgeon, and may often be successfully treated by operation. See BONE.

ORTHOPTERA, or *thop' ter a*. A large and important order of insects, including the crickets, locusts, grasshoppers, "katydid," cockroaches, mantids, and leaf insects. The name of the order is derived from the Greek for "having straight wings," though this description does not apply strictly to all of

the species. They have two pairs of wings, the first being harder and serving to protect the second pair. All members of the group have biting mouth parts, with which they obtain and chew their food. Most of them feed on live vegetable matter, but a few, notably the mantids, devour other insects. Metamorphosis is incomplete, as the newly hatched young are similar to the adult insects, except that they are smaller and lack wings. They do not have caterpillar and cocoon stages of growth. See INSECT.

ORTOLAN, or *tô lan*. A garden bunting of Europe. In the summer it is found as far north as Lapland, but in autumn it migrates southward to the Mediterranean countries. There great numbers are caught, usually in nets, and when they have been fed and fattened sufficiently, they are killed and



prepared for table use. The ortolan belongs to the finch family, and is about the size of an English sparrow. Its plumage is a mixture of black, white and brown. It is often seen in Britain in summer time.

Scientific Name.
The common ortolan belongs to the family *Fringillidae*. Its scientific name is *Emberiza hortulana*.

ORURO, o roo' ro. See BOLIVIA.

ORYX, oryx. A large antelope, native to East and North-east Africa. Both sexes have long horns and long tails with tufted ends. The horns are ribbed



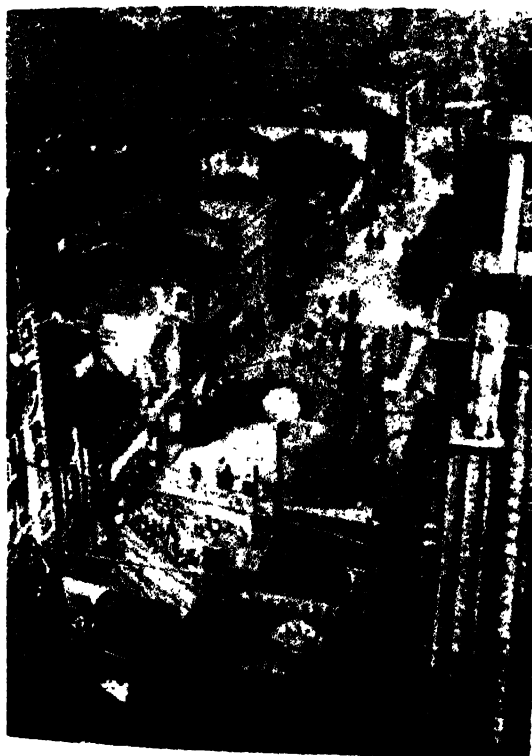
ORYX
On it are perched tick birds, which relieve it of parasites
Photo: Cherry Kearton

on the lower half. They are desert animals. The chief species are *O. beisa* (Somaliland) and *O. leucoryx* (Central Africa).

OSAGE, o' sayj, ORANGE. A valuable North American timber tree, good also for hedges. It has a milky, bitter sap and bears thick, fleshy roots. The roots and bark yield tannic acid, and the foliage is equal to that of the white mulberry as a food for silkworms. Its most valuable part, however, is the hard yellow wood, now utilized for cart wheels, fence posts, telegraph poles, paving blocks, and interior woodwork. The fruit is inedible.

Scientific Name. The tree belongs to the same family as the mulberries, *Moraceae* (see MULBERRY). Its botanical name is *Maclura aurantiaca*.

OSAKA, o' zah ka. A Japanese seaport



STREET IN OSAKA

Photo: Photopress

and second largest city of the country. See JAPAN.

OSBORNE, THOMAS, EARL OF DANBY. See LEEDS, DUKE OF.

OSCAN. A dialect spoken by one of the earliest known races to inhabit Italy. This dialect belongs to that division of Indo-

European speech called *Italic*, and shows a distant relationship to the Latin language.

OSCAR. The name of two kings who ruled Sweden from 1844 to 1907, except for the years between 1859 and 1872, and who also ruled Norway until the separation of Norway and Sweden in 1905. During the interval above noted, Charles XV, eldest son of Oscar I and brother of Oscar II, was king.

Oscar I (1799-1859) was the son of Charles XIV (John), who, as General Bernadotte, was a marshal of Napoleon. Bernadotte was chosen crown prince of Sweden and Norway by the Swedish Diet in 1810, and on assuming royal power, changed his name to Charles John; on the death of Charles XIII in 1818 he became King of Sweden and Norway. Oscar was born in Paris, but received part of his education in Sweden, and identified himself with the aims and aspirations of his adopted country. In 1844 on the death of his father, he came to the throne, and at once inaugurated a rule of peace and justice, reconciling Norway to the union with the sister kingdom. His especial desire was for Parliamentary reform, and he was successful in putting through several such measures. His wife was Josephine Beauharnais, grand daughter of Josephine, wife of Napoleon.

Oscar II (1829-1907), King of Norway from 1872 to 1905, and of Sweden from the first date until his death. He was the third son of Oscar I, and came to the throne on the death of his brother, Charles XV. From his accession he showed himself truly democratic, and won not only the respect but the affectionate regard of his subjects. During the industrial depression of the 'eighties, the adherence to Free Trade principles weakened, and protection for agriculture and manufactures was reintroduced in 1892. Near the end of the reign, universal suffrage with proportional representation, payment of members and other democratic reforms were also introduced. The two countries prospered under Oscar's sway, and he did his best to make of them one contented kingdom, but the desire of Norway for independence was too strong. In 1905 the King was obliged to submit to a separation, and Norway became an independent power under Haakon VII. This was a great blow to Oscar; some believe it was in part responsible for his death, but he refused to resort to arms to prevent the division.

An enlightened ruler and a man of much culture, as well as of commanding physical presence, Oscar stands out as a picturesque and noteworthy figure among the monarchs of nineteenth-century Europe. He published a volume of lyric poems, translations of Herder's *Cid* and Goethe's *Torquato Tasso*, and excellent *Memoirs of Charles XII*.

He was succeeded by Gustaf V, his son by Princess Sophia of Nassau, whom he had married in 1856. See SWEDEN (History); NORWAY (History).

OSIER, *o' sher*. A species of willow whose long twigs are used in basket-making and wicker work. This willow, *Salix viminalis*, of which there are about forty varieties, is a small tree about 30 ft. high, but in cultivation is grown more as a bushy shrub with long straight branches, bearing narrow lanceolate leaves with waved margins and golden-yellow catkins. Other species of willow also are grown in osier beds, such as the French Willow (*S. triandra*), the Purple Osier (*S. purpurea*), the Crack Willow (*S. fragilis*), and the White Willow (*S. alba*).

The osiers grow in moist situations, and their culture is carried on in England chiefly in the Fen district. The thin branches or "rods" are soaked in vats to make them pliable; then the bark is stripped off and the rods are dried in the sun.

OS INNOMINATUM, *os in nom in ay' tum*. See PELVIS; SKELETON.

OSIRIS, *o si' ris*. In Egyptian mythology, the husband of Isis and the father of Horus. He was the dying and reviving God of fertility and of the Nile, and was also worshipped as god of the dead and King of the Underworld. According to legend, Osiris was murdered by his brother Set, and his body hewn into fourteen pieces. Isis,

Bronze statue (British Museum). Originally a Syrian god of agriculture, Osiris became identified in Egypt with local Gods of the Dead, and finally God of the Nile and the Underworld.

M.

however, succeeded in restoring him to life by magic power, and Horus avenged his father's murder by defeating Set.

Osiris is usually represented in Egyptian

art as a mummy, holding in his hands the crook and sceptre of sovereignty. The centre of his cult was Abydos in Upper Egypt. In classical times his worship was introduced at Rome. See EGYPT, ANCIENT.

OSLO. Known as CHRISTIANIA until 1925, for long the capital and chief city of Norway, the centre of government and now its leading port, this city is situated on the southeastern coast at the head of Oslo Fjord, about 80 miles from the Skagerrak, an arm of the North Sea. The city was established in 1624 on the site of an older town, called Oslo. The present population is about 258,500.

The principal educational institution is the celebrated University, founded by Frederick VI of Denmark in 1811. The historical museum contains two Viking ships excavated in 1867 and 1880, and a third, that of Oseberg, which was later added to the collection. Between 1912 and 1921, large sums were expended on equipping quays, and vessels up to 10,000 tons can now be constructed in the shipbuilding yards. The harbour is ice-bound for three months in the winter.

The electrification of the State railways from Oslo to Drammen is contemplated.

The industrial interests of the city include cotton and woollen mills, paper, match, and soap factories, foundries, and machine shops. The principal exports are timber, wood pulp, nails, condensed milk, butter, and hides, of which the greater portion goes to Great Britain. Of the imports, Great Britain supplies cotton and woollen yarn, machinery, and raw metals.

OSMIUM. A very hard metallic chemical element, the heaviest substance known. It is twice as heavy as lead, with a specific gravity of 22.48. Osmium occurs in platinum ores, associated with iridium (which see). The pure metal is in the form of a fine black powder or a hard blue-grey mass. It is one of the hardest metals to melt, because it turns to vapour before a very high temperature is reached. When heated above 200 degrees, a very irritating suffocating vapour is given off, which may cause total or partial blindness by spreading a film of metallic osmium over the eyeball. Compounds of osmium stain the skin black. The metal is used to tip gold pen-points, and is employed in making standard weights and measures. Filaments made of osmium are used in some electric-light bulbs. The symbol of the element is Os (see table in article CHEMISTRY).

OSMOSIS, *os mo' sis*. Transfusion of a mixture of two fluids separated by a permeable membrane, such as parchment or bladder skin. It may easily be demonstrated

by tying a piece of parchment securely over one end of a glass tube containing a solution of sugar, and inverting the tube in a vessel of water, so that the water and the solution are at the same height. The water will pass through the membrane more rapidly than the sugar solution will pass out into the water, and this mixing will continue until there is the same solution pressure within and without the tube. Sometimes, if the apparatus is large enough, so much water will push its way into the tube as to raise the level of the tube liquid 20 or 30 ft. This pressure of the water, which is often many pounds to the square inch, is called *osmotic pressure*. It is governed by the same laws as those of gas pressure; that is, it depends on the concentration and temperature of the two solutions.

By the osmotic process, food and oxygen are absorbed by the blood in the human body. In cookery we have examples of osmosis in the swelling of dried fruits when cooked in water, in the shrivelling of fresh fruit when placed in strong sugar solutions, and in the shrinkage of meats when packed in salt. In each case there is diffusion of liquids through a porous membrane, with a more rapid diffusion of the weaker liquid. For an example of osmosis in plant life, see SAP.

OSPREY. A bird of prey of the hawk family, which feeds exclusively on fish, to obtain which it hovers and dives suddenly, like its relatives on land. In colour dark

of the world, the osprey once nested in Britain, especially on the Scottish Highland coast. The plumes sometimes called "osprey" are in reality common egret feathers, the osprey bears no plumes.

Scientific name. *Pandion haliaetus*

OSTEND, *os leud'*. See BELGIUM.

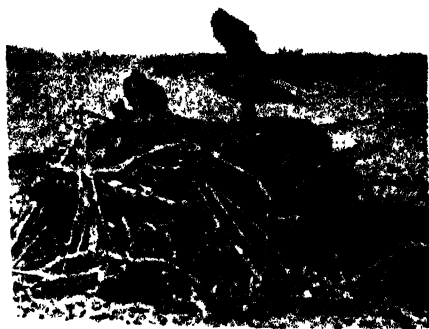
OSTEOPATHY, *os le op' a the*. A system of healing founded in 1874 by Andrew Still, who opened the first school of Osteopathy in 1892. It is based on the two cardinal principles that the body is a perfect machine, and that it contains in itself the remedies for the cure of all disorders, so that the use of drugs is unnecessary. Disease results from structural derangements of the human body, which may be exceedingly small (by far the most important of them being a spinal lesion), but cause interference with the nerve function or blood supply of the organs of the body, whose resistance is thereby lowered. The osteopath's work is to release the body's remedies, mainly by manipulative readjustment of the spinal or other lesion causing the trouble. An elaborate and detailed technique has been developed.

The present tendency is to avoid stressing the theoretical side of Osteopathy (which is not seriously claimed, like modern medicine, to be founded on the scientific study of disease), but to retain the methods of manipulative treatment, which, it is claimed, have proved the value of the system by successful results.

Osteopathy is not to be confused with what is known as 'manipulative surgery,' or "bonesetting."

OSTMEN OR EASTMEN. THE. This nickname was given by the Irish to the Norsemen who settled on the east coast in the ninth century. They were closely allied to the Norsemen of Northumbria, and from their Irish base they raided Scotland and the Outer Isles. Dublin, however, was still a predominantly Irish city at the time of the Norman invasion. The power of the Ostmen was broken in 1014 by Brian Boru's victory at Clontarf. Their hostility to the Irish made them allies of the Norman invaders.

OSTRACISM, *os' tra siz'm*. In ancient Athens, it was customary to banish citizens for political reasons. Whether or not a person should be exiled was determined by a general ballot, the votes being cast by means of earthenware tablets or oyster shells, on which the name of the culprit was written. The Greek name for these tablets, *ostrakon*, gives us the name ostracism. This was not a punishment for any proved offence, but was employed simply as a precaution for preserving peace. Banishment usually



OSPREYS

This photograph taken in Scotland, where ospreys now appear to be extinct, shows, right, the old bird, and left, half-grown birds.

Photo: Cherry Kearton

brown above, with lower parts white, it has a wing spread of 6 ft., the beak is hooked and the claws, in which the prey is held, exceptionally strong. Occurring in all parts



OSTRICHES

Photo South African Railways

lasted about ten years, after which the citizen might return to his estate. Themistocles, Camon, and Aristides all suffered ostracism at some period.

In modern usage, we speak of ostracizing persons for social or moral reasons. This expression means that such persons are ignored or banished from conventional circles.

OSTRICH. The largest of living birds, called *camel bird* by the ancients.

The ostrich is a native of Africa and Asia, and in former times, great flocks grazed over both continents. Ostriches have never been killed for food, as the flesh is coarse and

unsavoury. After the white ostrich became a valuable article, however, the bird was hunted with persistence, and exported in such stock ostrich farms, that it is practically extinct in its native haunts in the less accessible regions. An ostrich stands 7 to 8 ft. tall, weighs from 200 to 300 lb. Unlike other ostrich has only two toes—the third and fourth. The South American, or the American ostrich, is distinguished from the true African variety by the possession of an additional toe (see RHEA). The ostrich and the rhea are placed in the order

AN OSTRICH FARM IN SOUTH AFRICA
Photo South African Railways

along with two Australian birds, the emu and cassowary (see separate articles). The eyes of the ostrich are very large and the neck about 3 ft. in length, giving the bird a range of vision which enables it to detect danger at a distance of several miles. So powerful are its long, thick legs that the kick of an ostrich, usually directed forward, can disable and even kill horses as well as men. Both legs and thighs are bare of feathers, and the head and neck are covered only with sparse growth of down. The female has dull-grey and white or brownish-grey feathers, but the male glossy black body-feathers and wing and tail plumes of pure white.

The short wings of the ostrich are quite useless for flight, but help to lift its weight from the ground; and the ostrich has a stride of 25 ft. when moving at full speed, which may be 30 miles an hour.

The ostrich is unusually wary as a rule, but when pursued it runs in a circle. Thus, while a single hunter cannot overtake it, a group is able, by surrounding the ostrich and upon their prey, to capture it with a lasso, or kill it with a spear, rifle, or arrow. The ostrich hides its head when threatened with danger, and is very feeble.

The ostrich has from two to four eggs at a time, and a number of families may form small groups or colonies. Each female deposits her eggs in a circular hollow which the male has scooped out of the ground with his toes. The eggs weigh about 2 lb. On ostrich farms the birds are encouraged to lay more eggs by removing the eggs as soon as they are laid, and by the help of which they have attained full growth. Wild ostriches subsist on grass, leaves, and fruit, small birds, and insects, while those in captivity are fed with green clover and grain. The ostrich feeds its food with its bill, and it is said that it uses hard, gritty material that it finds in its path, such as stones, glass, bones, and the like. This it uses as other birds use gravel to assist in the work of digestion.

The ostrich has been reared in captivity for many years in Cape Colony, Algeria and Argentina, and becomes amenable to farm treatment. It may live for eighty years. It begins to bear feathers of commercial value at about twenty months, and plumage may be plucked on the average every seven months. With the change of fashion since the War the production of ostrich plumes has declined to a tenth of its former value.

Scientific Name. Ostriches constitute the genus *Struthio* of the family *Struthionidae*. The common African ostrich is *S. camelus*.

OSTROGOTHS. See GOTHS

OSWALD, KING OF NORTHUMBRIA (d. 642). Northumbria was divided into two kingdoms, Bernicia and Deira. In 617 the northern king, Ethelfrith, was defeated and slain by Edwin of Deira. His sons Eanfrith, Oswald and Oswy then fled to Scotland. Edwin was slain in 633 and Eanfrith became King of Bernicia, but was himself slain by Cadwallon of Wales a year later. Oswald succeeded, defeated Cadwallon and made



MALE OSTRICH
Photo

himself king of all Northumbria, becoming the most powerful sovereign in England. The Mercian domination which had caused the death of Edwin had gone far to stamp out Christianity. Oswald, however, had been converted in Scotland by priests of the old Celtic Church, and he used his influence to help Saint Aidan in his missionary work. He was killed in battle against Penda of Mercia.

OSWY OR OSWIU, KING OF NORTHUMBRIA (d. 671). On the death in 642 of Oswald of Northumbria, his younger brother Oswy became King of Bernicia. In 655 he avenged Oswald by the defeat and slaying of Penda of Mercia. Oswy became the dominant ruler of England and reunited Northumbria. His control extended over most of the Scottish Lowlands. In 664 he presided over the Synod of Whitby, at which it was decided that his realm should fall into line with the Continent and follow the usages and ceremonies of the Latin Church rather than those of the Celtic Church.

OTHO, MARCUS SALVIUS (32-69) One of three Roman Emperors who reigned for a short time after Nero, and who were raised to power by the soldiers. Otho had been a favourite at Nero's court. He secured the throne for himself by murdering his predecessor, Galba, an old man of 73 years. His accession was not recognized by the German armies, who proclaimed their general, Vitellius, Emperor. Vitellius led an army to Italy and defeated the Roman forces, whereupon Otho stabbed himself.

OTTAWA, ONTARIO The capital of the Dominion of Canada. Ottawa lies in the south-east of the province of Ontario, on hills rising above the southern bank of the Ottawa River, about 120 miles from where that stream empties into the St. Lawrence at Montreal. The city is joined by four bridges with Hull, a French speaking city situated in the neighbouring province of Quebec, on the opposite side of the river. It is connected with Kingston, Ontario, by the Rideau Canal.

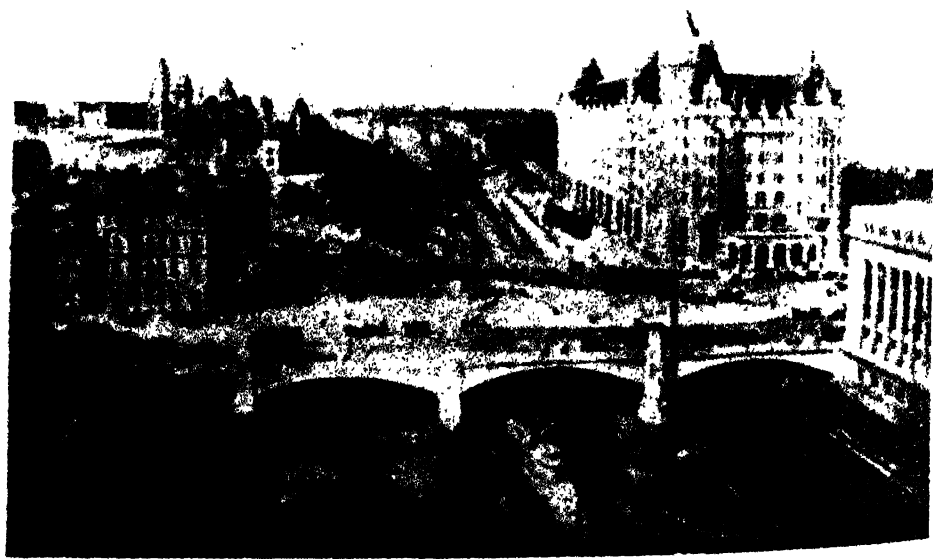
Just above the city the Ottawa River rushes over a picturesque cataract known as Chaudière Falls, whose name is French for *boiler*. Below the city are the Rideau Falls, where the Rideau River, divided into two channels by Green Island, flows into the Ottawa. The natural beauty of the surroundings has been preserved, while the city itself has splendid parks, wide tree-lined

avenues, and imposing buildings. Population, 126,872 (1931).

City and Structures. The city is divided by the Rideau Canal into two parts, the Upper Town, or western part, is predominantly English, and the Lower Town, or eastern part, is almost entirely French. The Sandy Hill district, however, which is east of the canal, is one of the most fashionable English-speaking areas.

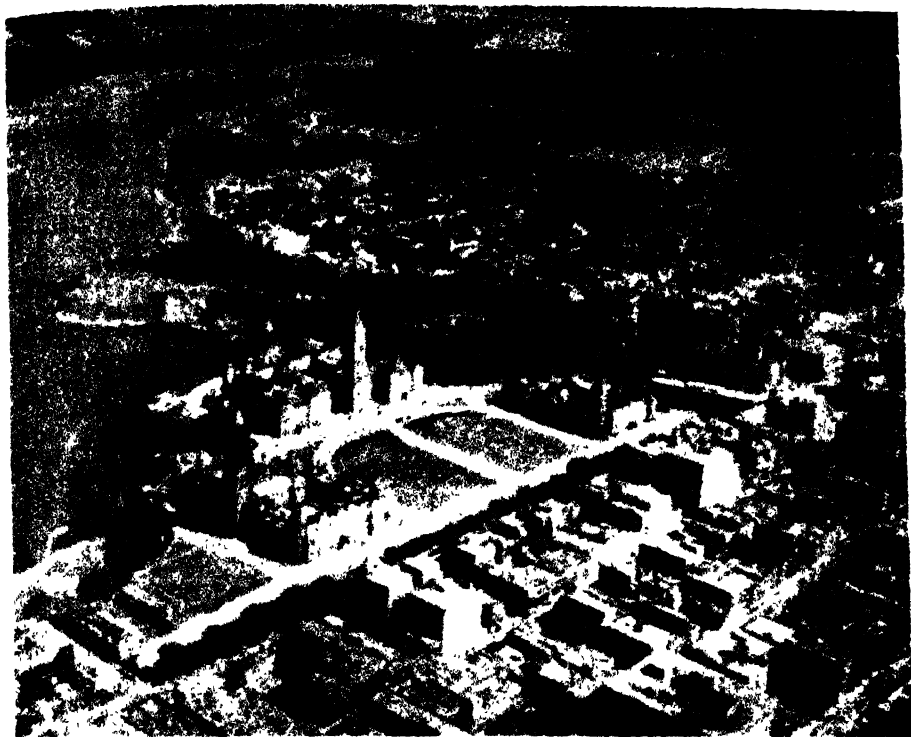
Conspicuous among the chief architectural features of the city are the Parliament buildings, which stand on the summit of the highest hill overlooking the river. These are in a modified Italian Gothic style, and are built of native sandstone. The central building, containing the halls of Parliament, is 470 ft. long, and the main tower is 185 ft. high. Adjoining the main building on the rear is the Parliamentary library, a beautiful octagonal structure. The corner stone of these great buildings was laid in 1856 by King Edward VII, then Prince of Wales. In February, 1915, fire seriously damaged the central building, but it was soon repaired and it is now double its original height.

A short distance from the Parliament Buildings is the Château Laurier, a magnificent hotel in the style of a French chateau. Directly across the street from the hotel, on the east bank of the Rideau Canal, is the Canadian National Union Station, completed in 1912. Among other notable



OTTAWA

On the right is the imposing Château Laurier, with a corner of the Central Station. On the left is the Post Office, overlooking the bridge, with the Parliament buildings in the distance.



OTTAWA, SHOWING THE PARLIAMENT BUILDINGS

Photo - Royal Canadian Air Force

buildings are the Roman Catholic Cathedral of Notre Dame, Christ Church Cathedral, Langevin Block (occupied by the post office department), the Royal Mint, Royal Observatory, Dominion Archives building, Victoria Museum, National Art Gallery, and Carnegie Library. Rideau Hall, the residence of the Governor-General, is outside the city.

The Canadian War Memorial, an arch 45 ft. high, was erected in 1926.

Education. Ottawa has excellent provided schools, a collegiate institute, a normal school, several private schools, and the University of Ottawa, a Roman Catholic institution founded in 1849 by the Oblates of Mary Immaculate. French-speaking students are much in the majority.

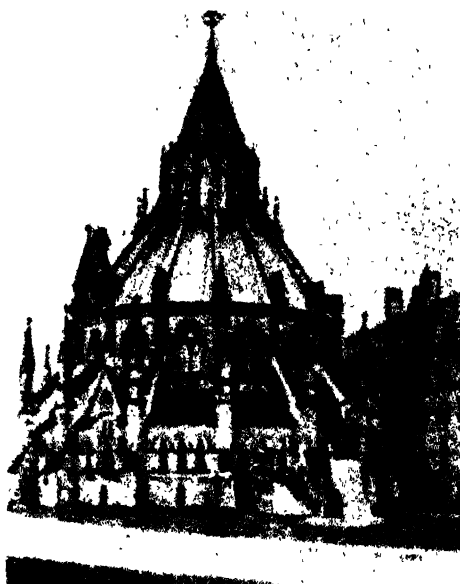
Transport and Industries. Ottawa's early growth was due largely to water traffic, but railways now carry much that was formerly water-borne. As the city developed, it gained the service of three great trunk lines—the Canadian Pacific, Canadian Northern, and Grand Trunk—and one shorter line, the Ottawa and New York. The Canadian Northern and Grand Trunk were later absorbed by the Canadian National system.

By the shortest railway route, Ottawa is 101 miles west of Montreal, and 217 miles north-east of Toronto.

Together with its neighbour Hull, Ottawa comprises one of the largest lumbering centres in the Dominion, the lumber being floated down the Ottawa and its tributaries. The Chaudière Falls provide ample hydro-electric power for more than 450 factories. Wood products are the most important goods manufactured.

History. The site of Ottawa was first visited by white men in 1613, when Champlain's party ascended the river, but it was not until 1827 that a settlement of any size was made. This was named Bytown, in honour of Colonel John By (1781-1833), a British army officer.

In 1854 Bytown was incorporated as a city, and its name changed to Ottawa. Four years later, it was selected by Queen Victoria as the capital of Canada. Montreal had been the capital until 1847, but had then forfeited its right to be the seat of government by the riots following the passage of the Rebellion Losses Bill. The other rivals, Toronto, Kingston and Quebec, were near the border



PARLIAMENTARY LIBRARY, OTTAWA
Photo: Canadian Pacific Railway

and exposed to possible attack. The first Parliament to meet in Ottawa sat in 1868, and thereafter the city's growth was rapid. Here the Imperial Economic Conference was held in 1912. See IMPERIAL PREFERENCE.

OTTER. General name of a group of fur-bearing land animals adapted to life in the water. The otters form a sub-family within the weasel family of carnivores and



OTTER
Photo: Photopress

are found in all continents except Australasia. Commonest is the river otter, which has a thick, flexible body and long, tapering tail; a large, flattish head; strong, sharp teeth;

large nostrils, small ears and eyes; short, stout legs with webbed toes; and sharp, curved claws. It is about 3½ ft in total length.

The fur, like that of the beaver, is of two kinds. The under fur is short, soft and whitish-grey, and is covered by long, stiffer hairs of a rich-brown colour. These otters are rapid swimmers, and they dive expertly after their principal food of fish. Common river otters make their homes in burrows on banks of streams or in caves above ground. Between February and April, two to six baby otters are born. The fur is used commercially for coat linings, collars, cuffs and gloves. After the outer long hair is removed, the fur is often dyed a seal colour, and sold as a substitute for that fur. See FUR AND FUR TRADE.

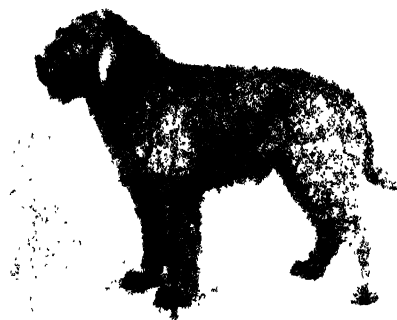
Sea otters, found only on North Pacific coasts, are becoming rare. Their food is shell fish.

In the East, fishermen have trained otters to help them in their task of fishing, and they have the cormorant. An Indian dog is also trained to this work by the Indians.

Scientific Name. Otters constitute the sub-family *Lutrinae* of the family *Mustelidae*.

OTTERHOUND. There are said to be no otterhounds left in this country. In olden days the otter—a great salmon predator—is generally hunted with a pack of foxhounds and otterhounds.

In appearance, except for the coat, the otterhound has a good deal of the bloodhound about him. The dog's head is



OTTERHOUND
Photo: Fall

26 in. (bitches 24 in.). The head closely resembles the bloodhound, the ears long and drooping, eyes dark and sunken, showing the hawk, legs perfectly straight, back strong, straight and fairly long, ribs deep and well sprung. Colour grizzle, blue and white, pepper-and-salt, yellow and fawn,

sometimes black-and-tan, and even white, and the coat is hard, thick and wiry.

OTTO. The name of three successive rulers of the Holy Roman Empire, father, son, and grandson. Their supremacy continued from 936 to 1002.

Otto I, the Great (912-973), succeeded his father, Henry I, as King of Germany, in 936. He was at once forced to resort to arms to defend his rights at home and abroad. The great nobles, putting forward Otto's brother Henry as their candidate for the crown, began a civil war, but before Otto could turn his attention to them, he was forced to contend against the Slavs and Hungarians to the east and south. Successful in this undertaking, he later defeated the turbulent vassals, taking from many of them their fiefs. These he bestowed upon friends and relatives on whose fidelity he could depend.

In 951 Otto was summoned into Italy by Adelaide, Queen of Lombardy, who sought his aid against Berengar, a claimant to the throne and to her hand. By defeating Berengar and marrying Adelaide, Otto established himself strongly in Northern Italy. On his return to Germany, he had to meet an invasion of the Magyars, whom he decisively defeated in 955. Again, in 961, he went to Italy to settle disturbances caused by Berengar, and in the next year, at Rome, he was crowned by Pope John XII as Holy Roman Emperor.

Later, Otto deposed the Pope who had crowned him, and had his candidate placed in the Papal chair as Leo VIII.

Otto II (955-983), the second Holy Roman Emperor, was the son of Otto I. He was crowned during his father's lifetime, and came to the imperial throne in 973 without resistance. Within a few years, however, the young Emperor was called upon to meet several formidable enemies, and defeated successively Henry, Duke of Bavaria; the King of Bohemia; and Lothair, King of France, who had taken possession of Lorraine. Later, insurrections at Rome and at Milan led the Emperor to cross into Italy, and he was successful in establishing his power in Apulia and Calabria. The Greek emperor, however, summoned to his aid the Saracens, and at Cotrone, in 982, Otto was severely defeated. While he was making plans for a campaign against the Saracens, he died at Rome.

Otto III (980-1002), third Holy Roman Emperor, was the son of Otto II and grandson of Otto I. At the death of his father, he was crowned King of the Germans, though then but three years old. His mother and grandmother acted as regents until 996, when Otto received the imperial crown from

Pope Gregory V and began to rule in his own right. In 998 he was called to Italy to put down a disturbance caused by Crescentius, a Roman noble, and was completely successful. He placed his tutor, Gerbert, in the Papal chair as Sylvester II, and began to form plans for reviving the glories of the Western Empire and making Rome again the great capital which it had once been. The Romans, however, rose against him, and he fled to Ravenna, where he died.

OTTO IV (1182-1218), Holy Roman Emperor and son of Matilda, daughter of Henry II of England, and Henry the Lion, Duke of Saxony. Elected German King in opposition to Philip of Swabia in 1198, he faced immediate hostilities. Later, quarrelling with the Pope, he conquered Southern Italy and while absent was declared deposed. He died endeavouring to reassert his authority.

OTTO I (1815-1897), The first King of Greece after its liberation from Turkey. When in 1832 Greece was recognized as an independent State, the Great Powers offered the crown to Prince Leopold of Belgium. Leopold declined the honor, and in 1832 the offer was made to the next in line, Otto, the second son of Louis I of Prussia, a King of Greece. The National Assembly conferred on the prince, for term years, a royal government. But in 1844 Otto's rule matter into his own hands. His taxes were increased. His kingship was unpopular. He hated the Queen, Amalia of Oldenburg, was charged with a large share in the government.

In 1844 a revolutionary outbreak compelled Otto to grant a Constitution and to appoint Greek Ministers. The sovereign policy of the government during the Greek War incensed the people, who wished to interfere on the side of the Russians. In 1862 a military rising compelled Otto to flee the country, and in 1863 the National Assembly elected as their king the second son of Christian IX of Denmark. See GREECE I of Greece.

OTTO OF HAPSBURG (born 1868). The Archduke Francis Joseph Otto is the eldest son of Charles Francis Joseph, Emperor of Austria, and of the Princess Zita of Bourbon Parma. He is the claimant to the thrones of Austria and Hungary, from which his father was driven, but from which he did not abdicate. His father died in 1912, and Otto of Hapsburg has since lived abroad in retirement. He has stated that he will make no attempt at a *coup d'état*, and will only assume his hereditary crowns on the express will of his peoples. Hungary is still under a kingdom, under a Regent. In Austria, royalism seems to be on the increase, and

in the summer of 1936 especially, a restoration appeared imminent. It is believed that this was averted for the time being by the non-interference agreement concluded with Germany. Though perhaps a restored monarchy would best serve Austria's interests, a serious obstacle is the hostility of the Little Entente, for those Powers hold territory once under Hapsburg rule and fear a restoration. It would probably deal a fatal blow to the Nazi plans for the union (*Anschluss*) of Germany and Austria.

OTTOMAN EMPIRE. A name applied to the former Turkish Empire. See **TURKEY**.

OTWAY, THOMAS (1652-1685). Dramatist. Although Otway wrote a considerable number of plays for the Restoration theatre, he is now remembered for two tragedies only: *The Orphan* (1680), and *Venice Preserved* (1682). Those two plays, which remained popular until well into the nineteenth century, owed their appeal to their pathos rather than to heroic passion, such as were being exploited by Dryden and others in their rhymed tragedies. Otway had a marked influence on the course of English drama, and was largely responsible for the bourgeois tragedy which became so popular in the eighteenth century.

OUDENARDE, or de nar' de, BATTLE OF SEE **SUCCESSION WARS**

OUDEH, oud. See **UNITED PROVINCES**

OUNCE. A measure of weight and of volume. In troy weight, the ounce is equal to one-twelfth of a pound, or 480 grains; in avoirdupois weight, it is equal to one-sixteenth of a pound, or 437½ grains. Grains are

the same in all systems of weights and measures. The troy ounce is used in weighing precious metals, and is equal to the apothecaries' ounce, employed in compounding prescriptions of dry medicines and drugs. The avoirdupois ounce is the unit employed in weighing ordinary merchandise.

(The name is derived from the Latin *uncia*, "a twelfth.")



OUNCE
Photo. Bond

OUNCE. A name given to the *snow leopard*, a member of the cat family, whose home is in the mountain regions of Central Asia. Its rough, heavy hair is pearl white.



LIMESTONE OUTCROP, KIGOMA PROVINCE, TANGANYIKA
The native warriors make a white paste from the rock and paint their faces with it
Photo. H. M. F. African Dependencies

and marked with leopard-like spots. The ounce feeds chiefly on goats, sheep, or other animals, but seldom attacks man. Its tail is long and bushy, while the unusually warm coat of fur protects it from cold which others of the cat family could not endure. If the animal is taken into more temperate zone the fur soon turns darker. See LEOPARD.

Scientific Name. The ounce belongs to the family *Felidae*. Its scientific name is *Felis uncia*.

OUTCROP. The appearance, at the surface, of a bed or stratum of rock. The line of outcrop is where the bed emerges from beneath the next bed above. The outcrop of a bed varies (1) with the inclination of the bed, being greatest when they are horizontal or only slightly inclined, (2) with the surface features of the land.

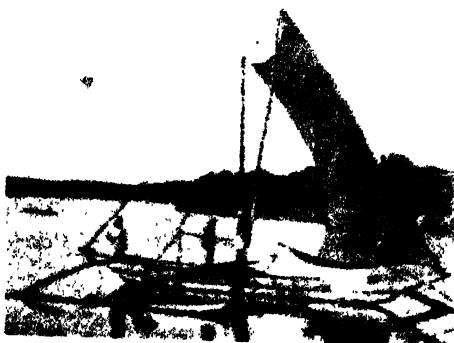
OUTLAWRY. Type of legal proceeding formerly taken against a person who had been indicted for a crime and did not appear to plead or to receive sentence. A person so outlawed had no standing in the law; he forfeited all his property and legal rights, it was every man's duty to capture him and it was no crime to slay him if he resisted capture; it was a capital crime knowingly to harbour an outlaw. If captured, he was put to death on the mere proof of the judgment of outlawry, if the original offence alleged was one punishable with death; if not, he was liable to perpetual imprisonment. Later, a modified form of outlawry, involving forfeiture of goods but not sentence of death or imprisonment, was introduced in civil cases. Outlawry in civil cases was

abolished in 1879. In criminal cases it is still theoretically possible but has become obsolete, owing to the greater efficiency of the modern police in tracking down persons for whose arrest a warrant has been issued, and to the development of the system of extradition of offenders who have fled to foreign countries. The last case of outlawry was in 1859.

OUTRAM, oo' trām, SIR JAMES (1803-1863). An English soldier and statesman. He was born in Derbyshire, and went to India in 1819 in the service of the East

India Company. During the Afghan War of 1839, he rendered good service, and in 1857 joined the expedition against Persia. It was during the Indian Mutiny, in 1857, however, that Outram chiefly distinguished himself. Offered the command of the relief forces sent to Lucknow, he refused to take precedence over General Havelock, whom he accompanied as chief Commissioner of Oudh, and he had a large part in the victorious campaign against the insurgents. In 1860 ill health forced him to come home.

OUTRIGGER BOAT. A boat with rowlock extended to increase the leverage of the oar



NATIVE OUTRIGGER OFF CAYMAN
Photo Tropical

In the Indian and Pacific Oceans, it is a canoe with a framework attached to the sides, to prevent upsetting.

OUZEL, oo' z'l. See DIPPER.

OVA. The name given to the eggs of fishes, shell-fish, etc.

OVERBECK, JOHANN FRIEDRICH (1789-1869). One of the "Nazarene" painters, German Catholics who lived in an old monastery in Rome, with the object of emulating painters of earlier religious schools. His work is typical of himself, subdued and restrained. He lived a life of intense devotion and was the natural leader of the young artists. He is not accounted, by modern standards, to be a great painter. Art, he held, was a harp on which he would "fain hear always sounding hymns to the praise of the Lord."

OVERBURY, SIR THOMAS (1581-1613) Born Ilmington, Warwickshire, educated Queen's College, Oxford. Through association with Robert Carr (afterwards Viscount Rochester), he won royal favour and was knighted by James I in 1608. His efforts to prevent the marriage of Rochester and the divorced Lady Essex brought Overbury into disfavour, and after his refusal to accept diplomatic office abroad, he was, in



SIR JAMES OUTRAM
(National Portrait Gallery)

English soldier and statesman. He was born in Derbyshire, and went to India in 1819 in the service of the East

1613, consigned to the Tower as a close prisoner. In less than four months he died, and a jury returned a verdict of natural death. Rochester, created Earl of Somerset, married Lady Essex within a few months. A boy's confession in 1615, however, revealed that Overbury had been poisoned. The Earl and Countess of Somerset were convicted of his murder, but were soon pardoned and released. Four of their accomplices were executed. Overbury was a learned and distinguished writer.

OVERHEADS. In accountancy, these are the expenses of production that cannot directly be charged to one product or process but can only be apportioned. These include what are also known as "establishment charges," i.e. rent, rates, taxes, managerial salaries, maintenance of buildings, provision against depreciation of plant, legal expenses, etc. Such charges do not, as a rule, vary from year to year, and normally they can be definitely related and allocated to output. Careful costing enables one to determine the actual cost of producing the total output of a works, and when this has been ascertained, division of overhead charges to the units of production is a simple matter. Thus, the manufacturer should be able to calculate his selling costs and add a fair margin of profit. Difficulties arise, however, when the output falls and the same aggregate of overheads has to be recovered from a smaller number of units produced.

OVERSEAS TRADE, DEPARTMENT OF. See TRADE BOARD OF.

OVERTURE. In music, a term originally denoting the opening bars of a dramatic composition, but later something more lengthy and independent. In classical opera the overture frequently stands by itself as a distinct composition embodying and, as it were, introducing the main themes of the music that is to follow. Thus, in the concert-hall, it is commonly played for its own sake as part of an ordinary programme. Wagner, who aimed above all at musical continuity in his operas, wrote important and elaborate overtures, but joined them to the opening bars of the first scene. When his overtures are treated as independent concert items, a modified ending, usually adapted from the final scene of the opera itself, is added to bring the music to a close.

OVID (PUBLIUS OVIDIUS NASO) (43 B.C.-A.D. 18). A celebrated Roman poet, born at Sulmo, in the Apennine Mountains. He was destined for the legal profession, but after studying for a time in Athens, he took up his residence in Rome, and being unfitted, through natural indolence, for a public career, he contented himself with one or two subordinate offices. Soon even these

were given up, and he spent his time in writing and in the pursuit of pleasure. Ovid was twice married while very young, but each time divorced his wife shortly after marriage, and before he was thirty, was married for the third time.

About the year 9, an edict of Augustus banished Ovid from Rome to Tomi, a town on the shores of the Black Sea. The only possible reason was the publication of the *Tristia* (*Amatoria* (Art of Love). Life in the barbarous country to which he had been sent was a most unpleasant change from the luxurious life of a Roman man of letters, and Ovid himself and his many friends made repeated attempts to shorten the term of his banishment, or at least to secure a change of place; but all such attempts were in vain, and the disappointed poet died at Tomi.

Ovid's ease of style and musical versatility—he was a master of the elegant form and spirited play of fancy, tempered by the sorrows of exile—have weighed in his favour rather than profundity of thought or poetic insight. The best of his works include *Ars Amatoria*, *Epistulae Heroidum* (letters from heroines to their lovers), *Amores* (Love Elegies), *Remedia Amoris* (Cures of Love), *Tristia* (Letters from *Tomus ex Ponto* (Letters from Pontus), a poetical calendar, and the *Metamorphoses*.

OWEN, ROBERT (1771-1858). A leader of the co-operative movement in England. He was born of poor parentage at Newtown, Montgomeryshire, and began life as assistant to a linen draper at Stamford. With small capital borrowed from his brother, he set up as a cotton spinner in Manchester and quickly won success.

In 1799 he became part-owner and manager of mills at New Lanark, Scotland, and at once began to apply his principles of industrial democracy and factory reform in practice. He employed no children under the age of 10, and for those between 10 and 14 he established schools. He opened shops for the supply of goods to his work people at low cost.

Owen eventually secured sole control of the New Lanark mills. He was helped by money subscribed by certain Quaker and



ROBERT OWEN.
Photo: Brown Bros.

other philanthropists, including Jeremy Bentham and the elder Sir Robert Peel. Owen's mills quickly became famous for their humane management, and he was consulted by many governments on questions of factory reform.

OWL. A large-headed solitary bird of prey which hunts for food at night. Species are found throughout the world. Some are small, others

handsome bird which hunts by day and attacks ducks and other valuable waterfowl; this species is occasionally found in Britain. *Long-eared owls* appear in the woods of both hemispheres. *Short-eared owls* are widely distributed over open fields and meadow lands. The fierce *hawk owl*, very rare in Britain, also hunts by day. The *brown* or *tawny owl* nocturnal in habit, is found locally in wooded regions.

Scientific Names. Owls are often grouped with eagles and hawks in the order *Raptores*, but many



BARN OWL
Photo Bond



EAGLE OWL OF SOUTH AMERICA
Photo Booth Steamship Co



HORNED OWL
Photo Cherry Kearton

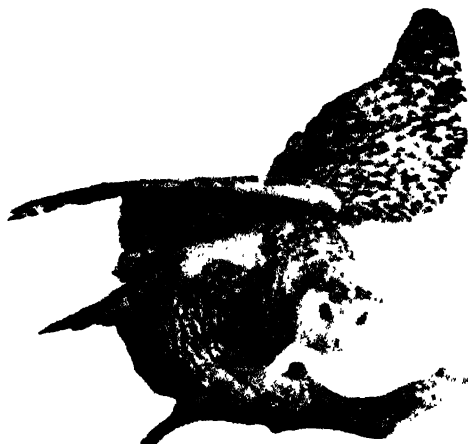
are as large as some of the eagles. Their eyes are especially fitted to see in very dim light, and in the daytime they sleep in some secluded spot. The eyes are set close together and cannot move in their sockets as do human eyes, so if owls wish to look in any direction other than straight ahead, they must turn their heads. The sense of hearing is very keen. As an emblem of wisdom, the owl in the mythology of the Greeks was sacred to Athene.

Their bills are short, strong and hooked. The legs are short and powerful, usually feathered to the toe. The body plumage is soft and thick, and the wings are especially adapted for quick, noiseless flight. Some species have tufts of feathers which look like ears or horns.

They prey on rodents, mice, squirrels, and other birds and insects. The prey is usually swallowed whole, if not too large, and the bones and hairs are later ejected through the mouth in pellets. Holes in trees, caves, old buildings and church belfries are the favourite homes of owls.

Species. The *screech* or *barn owl*, 12 in. in length, is one of the most common species; it is especially valuable as a destroyer of mice. The *snowy owl* of the north is a large,

naturalists isolate them in the order *Strigiformes*. The species mentioned above are classed as follows: screech owl, *Flammula alba*; snowy owl, *Nyctea*



ARCTIC OR SNOWY OWL
Photo U & U.

nyctea; long-eared owl, *Asio otus*; short-eared owl, *Asio flammeus*; hawk owl, *Surnia funerea*; brown owl, *Syris aluco*. The eagle owl is *Bubo virginianus*, the horned owl (N. America), *Bubo virginianus*.

OXALATES. See OXALIC ACID, below

OXALIC, oh sal' ik. ACID. One of a series of organic acids, of great importance in industry. At ordinary temperatures, it is a white crystalline solid, odourless, but has an acid taste. Its salts, called *oxalates*, are found in several plants, including rhubarb, dock, tomatoes, and wood sorrel. (The latter, the botanist's *Oxalis acetosella*, furnishes the name of the acid.) Oxalic acid is very poisonous. Antidotes for oxalic acid poisoning include calcium salts, limewater, plaster and magnesia.

The compound is prepared commercially by heating sawdust (cellulose) with caustic potash and caustic soda. It is soluble in water, and is used in calico printing, in the bleaching of flax and straw, as a cleaning agent on brass and copper, to remove ink and rust stains, and in dyeing and tanning.

Chemical Formula. The formula for crystals of oxalic acid is $C_2H_2O_4 \cdot 2H_2O$. In this form it is a union of carbon (two atoms), hydrogen (two atoms), and oxygen (four atoms) with two molecules of water ($2H_2O$). When heated to $212^\circ F.$, the crystals lose the water molecules and the anhydrous acid ($C_2H_2O_4$) is obtained.

OX-EYE DAISY. A species of hardy perennial chrysanthemum, almost as well-known and as popular as the common cultivated daisy. Its large white-rayed flowers are excellent for cutting. The plants grow to 2 ft. in height and flower continuously from June until mid-August. They thrive in any good soil and can be grown either from seed or by division of rootstock. The yellow ox-eye, sometimes called corn marigold, has large, brilliant yellow flowers. This variety flowers in June and July, and again in October and November. Both varieties grow wild in many parts of England.

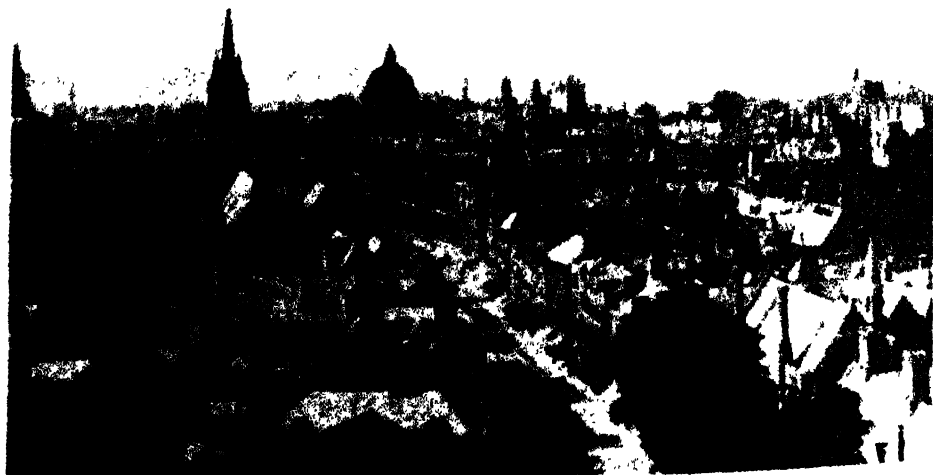
Scientific Names. The white ox-eye is known as *Chrysanthemum leucanthemum*, and the yellow ox-eye as *C. segetum*.

OXFORD. A City and County Borough and the County town of Oxfordshire. It lies 54 miles from London, at the confluence of the Thames and Cherwell, and has a population of approximately 83,000. It is served by G.W. and L.M.S. Railways.

The first historical mention of Oxford occurs in 912, but its legendary history, supported by remnants of contemporary buildings, goes back for nearly two centuries prior to that date. William the Conqueror found it an important strategic point on the borders of Mercia and Wessex, and caused it to be strongly fortified. An ancient tower ("The Castle") and a still more ancient "Castle Mound" bear witness to the military importance of the town.

It was not until the twelfth century that students began to appear in what was then a prosperous market town. The fifteenth century saw the beginnings of the University as it is known to-day. This great institution rapidly achieved a predominant position, and the town occupied a subservient place for over five hundred years. In recent years the balance has been restored by the advent of large industrial undertakings, notably the manufacture of motor-cars and precision steel products. Oxford of to-day presents the curious combination of an ancient center of learning and a modern manufacturing town.

Notes on the Colleges will be found in the article on Oxford University. There are, however, numerous places of interest which are not attached to any College. The cathedral, the foundation of which began about



OXFORD FROM MAGDALEN TOWER
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1004 although the smallest of English Cathedrals, abounds with interest. It is interesting to note that this Church is not only the Cathedral of the Diocese but is also the Chapel of Christ Church, within the boundaries of which it is located. Other points of interest are to be found in the churches of St. Mary the Virgin, and of St. Peter-in-the-East, with its Norman crypt, and the Martyrs' Memorial, which commemorates the deaths of Bishops Ridley, Latimer and Cranmer (1555-6). The Bodleian Library is of world-wide reputation. It was founded in the fifteenth century and refounded by Sir Thomas Bodley about 1598. It enjoys the privilege of receiving copies of every book published in Britain. The new Bodleian is planned to hold five million volumes. In recent years, the discovery of a medieval "Painted Room" in a house which was once the Crown Tavern has brought to light one of the most important Shakespearean relics in the country, for it was almost certainly this room in which the poet slept during his frequent visits to Oxford.

One of the greatest attractions to Oxford is to be found in the boating facilities afforded by its numerous rivers and streams.

OXFORD AND ASQUITH, HERBERT HENRY, FIRST EARL OF (1852-1928). English statesman, raised to the peerage in 1925. His Ministry was notable for the Parliament Act, 1911, which abolished the power of the House of Lords to veto legislation and thus forced the Government either to withdraw a Bill or to appeal to the people. A suspensory or delaying power was substituted, but the speaker of the Commons was given the power of declaring a Bill to be a Money Bill, in which case the Lords could neither amend nor delay it. It was also notable for the struggle for Home Rule in Ireland, and finally for the opening of the World War. Personally considered cold and lacking in magnetism, Asquith carried into a younger generation the habits of thought and speech of the Victorian parliamentarians: scholarly quotation, precise and happy choice of phrase, verging on prolixity, and a philosophical outlook.

Two years after his graduation with honours from Balliol College, Oxford, to which he had proceeded with a scholarship from the City of London School, Asquith began the practice of law, and became distinguished for sound judgment and clear thinking, qualities which also marked him in Parliament. His long service in the House of Commons began in 1886. In 1892 he became Secretary for Home Affairs in Gladstone's last Ministry, and from 1895 to 1905 was one of the leaders of the Opposition. His action in using troops to suppress the

Featherstone riots was criticized by extremists, but was vindicated by a commission of inquiry. During the Boer War he again estranged Radical opinion by his support of Lord Rosebery and those Liberal Imperialists who refused to hamper the British Government. The tariff controversy from 1903 onward gave him the opportunity of re-establishing himself in the favour of his party. His appointment to the Cabinet in 1905 was a natural result, and as Chancellor of the



LORD OXFORD AND ASQUITH

Exchequer he was really the government leader, because of Sir Henry Campbell-Bannerman's poor health. In his Budget of May, 1908, he laid the foundation upon which his successor, Lloyd George, built up his old age pensions scheme. In the spring of that year he succeeded Campbell-Bannerman as Prime Minister.

The years from 1908 till his retirement in 1916 were among the most troubled in British history. The problem of the House of Lords was the subject of a conference of members of all parties, but no solution was reached. The death of King Edward in 1910 was followed by a General Election in which the Liberals lost their great majority. Liberals and Conservatives were returned in equal strength, and Asquith was dependent

upon the Labour and Irish parties. The various parties to the Coalition were in agreement over the question of the Lords, and the "Parliament Act" of 1911 was forced through by means of a threat of creation of Liberal peers in any number which might be necessary. The Labourites received the Trade Union Act which legalized the political levy; the Irish obtained their Home Rule Bill; and free imports were secured against the Protectionist attack.

War Premier. In Ireland civil war was threatening; armed forces were raised both in Ulster and in the South, and the resignation of the officers at the Curragh showed the danger that the discipline of the forces of the Crown might not survive the test if they were ordered to attack the Ulstermen in order to drive them out of the Union; yet armed resistance to the law could not be tolerated with safety. During this crisis came the murder at Sarajevo and the opening of the World War. At first all parties, including Irish Nationalists, seemed to drop old grievances and rally round the Crown, and Asquith, calm, even tempered, and urbane, seemed the ideal leader of a national union. In May, 1915, the Unionist leaders were admitted into his Coalition Cabinet. But disappointment over the progress of the War, further trouble in Ireland—temporarily pacified by the passing of the Home Rule Bill but the postponement of its enactment till after the War—which led up to armed rebellion in 1916, a shortage of high explosive shells at the Front, and a general feeling that there was a lack of vigorous leadership, led to a series of political manoeuvres which ended in the retirement of Asquith in December, 1916; Lloyd George became Prime Minister in a new Coalition Cabinet.

Defeated in the Election of 1918, Asquith later returned to Parliament and became leader of those Liberals who refused to follow Lloyd George. In 1922 he decided the fate of Mr. Baldwin's administration by giving his provisional support to Ramsay MacDonald, who was thus enabled to form the first Labour Government. Within a few months the Conservatives returned to power; Asquith again lost his seat; and in 1925 he was raised to the House of Lords. The next year he supported the Government during the General Strike and openly rebuked Lloyd George for his attitude. This was his last public performance of note, and in February, 1928, he died at his Oxfordshire home.

OXFORD, EARLS OF. This title has been held by more than one family. Aubrey or Alberic de Vere, created Earl of Oxford by Matilda, Lady of England, was the grandson of Alberic, who had been granted numerous

lordships by William I. His father, also Alberic, had by Henry I been appointed Lord Great Chamberlain, an office long held by his successors. The earldom was confirmed by Henry II. This illustrious family played a conspicuous part in English life, although Macaulay's panegyric overestimates their importance; that their name has become a synonym for "blue bloodedness" is largely due to Tennyson, to whom may be also ascribed the popular impression that it was "Vere de Vere."

Aubrey, 2nd Earl, supported John, but his brother Robert, 3rd Earl, was one of the twenty-five guardians of the Charter. Robert, 5th Earl, was taken prisoner with young de Montfort shortly before the battle of Evesham. John, 7th Earl, a renowned soldier, fought at Crécy and Poitiers. Robert, 9th Earl, a person of wit and charm, was the close friend of Richard II, who created him Marquess of Dublin and Duke of Ireland. He was hated by the Duke of Gloucester and Lord Arundel, the rough fighting-men who bullied the young king, and he roused indignation by putting aside his wife, the Lady Philippa, in favour of a granddaughter of Edward III, Isabella Lancerona, a foreigner who had come to England with the Bohemian queen. In 1386 certain of the great lords insisted on his dismissal, but he fled abroad. Yet when he took to arms, he was, however, successful, and his forces were scattered at Radest Bridge in Oxfordshire, he himself escaping by swimming. He fled to the Continent, where he was killed in a boat-burn near Louvain in 1392. Richard, in the true of his power, had the embalmed body reinterred with stately ceremonial at Earl's Colne; his stern treatment of the former Lords Appellant was probably a tribute to de Vere's memory. To his infirm uncle Aubrey, Richard II restored the earldom and the manors, but not the Chamberlainship.

John, 12th Earl, a staunch Lancastrian, was beheaded by order of Edward IV in 1461. His son John, 13th Earl, was one of the few Lancastrians of note to support the Earl of Warwick when he assumed the Red Rose; it is said that the Battle of Barnet was decided by Warwick's men mistaking the banner of de Vere for the Sun in Splendour of Edward IV. Oxford escaped abroad. In 1485 his handling of the vanguard of archers contributed largely to Henry Tudor's victory at Bosworth. He was restored to the Great Chamberlainship and appointed Lord High Admiral and Constable of the Tower, and he acted as Lord High Steward for the coronation of Elizabeth of York. He held high command against Simnel's men and against Lord Audley at Blackheath. He died in 1513. Edward, 17th Earl, was one

of the judges of Mary Queen of Scots. He was distinguished for wit and chivalry. He held a command against the Armada and he survived, to die in 1604. During his lifetime he was renowned as a poet; in recent years he has been further honoured by being numbered among the suggested authors of Shakespeare's plays. His cousins, Francis and Horatio, grandsons of the 15th Earl were famous fighting-men; Horatio, who enjoyed the same calm temper as Marlborough, was acknowledged to be England's best captain of the day. He served in Holland, where George Monk was one of his officers, and was created Baron Vere of Tilbury in 1625, ten years before his death. He was 18th Earl, and Robert, 19th Earl, was both killed in action, at the sieges of Munda (1625) and Maestricht (1632) respectively. Aubrey, 20th Earl, fought for Charles I. He left no male heir and the peerage died with him in 1702.

Robert Harley, Earl of Oxford and Mortimer (1671-1744). Originally Whig Member



ROBERT HARLEY, EARL OF OXFORD
(National Portrait Gallery)

for Tregony, in Cornwall (in 1690), Harley later turned Tory and in 1701 was chosen Speaker. He was appointed Secretary of State in 1704. Marlborough and Godolphin were becoming closely allied with the Whigs, for they were enthusiastic for the War of the Spanish Succession. Harley sought to consolidate his position by aid of his cousin, Mrs. Masham, a lady of the Queen's bed-

chamber, but in 1708 he was forced to resign. On the fall of the Marlboroughs in 1710 he became Chancellor of the Exchequer, head of the ministry, and, in the next year, Earl of Oxford and Lord Treasurer. He opened negotiations with France, ending the war in 1713 by the Treaty of Utrecht. He had before this quarrelled with Mrs. Masham, who transferred her great influence to his colleague and rival St. John, Viscount Bolingbroke. Harley had corresponded with St. Germans, but does not appear to have favoured a Stuart restoration. Bolingbroke, who appears to have been working for that end, persuaded Anne that Harley was insufficiently zealous for the Anglican Church, and in 1714 he was dismissed. After the accession of George I an impeachment of Harley was started but dropped. Harley was a man of taste and a patron of literary men. His ability as a minister has been very variously assessed. He was a heavy drinker, according to one contemporary, he was seldom sober when he conferred with the Queen. The title expired with the 6th Earl of this creation in 1853.

OXFORD MOVEMENT. The name given to the revival in the Church of England, which began at Oxford in 1833. Its immediate origin was the suppression by the Government of ten Irish bishoprics.

In June, 1833, John Keble preached a famous sermon at Oxford on National Apathy, considered to be the first step in the movement, and in September appeared the first of the series of "Tracts for the Times" which continued to be issued at intervals for some years, and gave the leaders of the movement their name of "Tractarians." These were short papers written by Newman, Pusey and others, aiming to present the whole Church as the Divine Society, of which the Anglican Church was a true branch, and treating of its doctrine, polity and worship from a Catholic point of view.

The four chief leaders of the revival were Newman, Pusey, Keble and R. H. Froude, all men of weight in the University, and their influence brought a very large number of adherents to the movement, which became almost popular. But this wide favour disappeared on the publication of Tract 90 by Newman in 1841. In it he argued that the thirty-nine Articles of the Prayer Book were capable of an entirely Catholic interpretation, and from that time the movement tended to be looked upon as a conspiracy to throw the Anglican Church into the arms of Rome.

By degrees, as the movement extended its principles to the parishes and was seen to give fresh devotion to the clergy, who revived and brightened the services, cleaned and

adorned the churches and promoted the extension of the Church's work, it rapidly gained strength, bringing a new spirit and new life into the Anglican Communion, a fact which was generally acknowledged in its Commemoration of the Centenary of the movement in 1933.

OXFORDSHIRE. A south-midland county of England, with an area of 470,808 acres and a population of 129,082 in 1931.

Physical Features. A wide belt of the central portion of the county is level and uninteresting, especially to the north of the city of Oxford; but the uplands of the north-west and south-east are districts of rare distinction, and within the county are some of the loveliest reaches of the Thames.

The county may be regarded as a kind of elongated basin placed in a south-east north-westerly direction. In the north-west the highest ground is part of the Cotswold Ridge, with a mean elevation of 500 ft., rising to about 780 ft. near Great Rollright, sloping steeply to the north and west and more gently to the south-east. The uplands are generally bare and calcareous, but the eroded valleys, many of them sharply defined, are well-wooded and contain the majority of the villages. To the south-east, and divided from these uplands by a narrow valley, is a wide tableland which extends from Burford in the west to the Ouse Valley on the borders of Buckinghamshire and is frequently over five miles in breadth. It is broken by three river valleys. To the south-east again, across the plain of mid-Oxfordshire, is the beech-clad escarpment of the Chilterns which includes the highest point in the county, over 800 ft. at Shirburn Hill.

The whole county falls within the watershed of the Thames, which forms the southern

boundary for nearly 80 miles between Henley and Lechlade. The beauty of the chalk gorge where the Thames flows between the Chilterns and the Berkshire Downs is well known but the quality of some of the upper reaches, especially between Oxford and Eynsham where it flows beneath the wooded slopes of Wytham Hill, is little inferior. In this part of its course it is sometimes known as the Isis. Of its tributaries, the most important are the Cherwell, which flows south to Oxford, the Evenlode, pursuing a tortuous

course to south-east, the Windrush, which joins the Thames at Newbridge and the Thame flowing west to join the Thames then south to the river.

Climate—The county is generally of a central plain climate. The mean annual rainfall is between 25 and 20 in., being lowest to the north of Oxford. The mean annual temperature of the air at Oxford is 49° on high ground in the north-west less than 48°. The Central Plain, owing to the influence of the two great

river valleys, the Thames and Cherwell, is decidedly humid.

History. Of Palaeolithic man the traces are negligible, but there is evidence that some scattered tribes of Neolithic man dwelt in these parts. Nothing is known of the tribe or tribes who were settled here in the first centuries B.C., though it is estimated that the Dobunni were in occupation of most of the country to the west, and at least some parts of Oxfordshire. These are said to have offered a stout resistance to the Roman commander, Aulus Plautius, in A.D. 43. The Romans themselves instituted no far-reaching developments.

From the departure of the Romans onward, Oxfordshire played an important part in British history. It was disputed ground





OXFORDSHIRE

1. Banbury Cross and South Bar. 2. The Trout Inn, Godstow. 3. Cottages of the Cotswold Country.
4. Little Milton village. 5. The Rollright Stones. 6. The Whispering Knights of Great Rollright
7. A view of the Thames from Goring

Photos: L. V. Grinnell; Frith, Taylor

for several centuries between the rival kingdoms of Wessex and Mercia. At least two great battles were fought in the eighth century—the earlier at Burford, when most of the county fell under the sway of Wessex; and later at Benson, when the ground was recovered by Mercia. At this time, too, Dorchester was the see of the bishopric of Mercia, and was, with some interruptions, the episcopal see first of Wessex, then of Mercia. After the Norman Conquest, this See became centred at Lincoln. The eleventh century has varied traditions of the inroads of the Danes.

After the Norman Conquest, castles were built at Oxford, Dorchester and elsewhere. At the opening of the Great Civil War, Banbury was a strong Parliamentary fortress; but after the victory of King Charles at Edgehill in 1642, Banbury surrendered, and thereafter the county was solidly Royalist. Oxford finally fell to the Parliamentarians in June, 1646.

The county has but little part in subsequent history. The most notable tendencies have been the development of the university city and the introduction of intensive methods of agriculture. At the present time the county returns two Members to Parliament for the Banbury and Henley Divisions respectively. In addition, the borough of Oxford returns one Member.

Communications. The county is well served by the G.W.R. Water transport on the Thames is considerable, the Oxford-Birmingham Canal, which follows the course of the Cherwell, is also in use.

Agriculture and Industries. More than 70 per cent of the total acreage is under cultivation. Only the Chiltern ridges and the highest ground on the Cotswolds are unsuitable. The principal cereal is wheat; oats and barley also are important. Dairy-farming is followed round Oxford and Banbury. The Cotswold country was formerly noted for its sheep and, though the characteristic Cotswold breed has largely died out, many sheep are still raised. The Cherwell basin is chiefly permanent

pasture. Pig-breeding has been introduced recently.

Historically, the woollen industry is of first importance, and as early as the thirteenth century Cotswold wool was highly valued. The survival of this may be seen in the continued manufacture of blankets at Witney. The neighbourhood of Oxford has become industrialized during the nineteenth century, and is associated particularly with the manufacture of motor vehicles and pressed steel for motor-car bodies.



MORRIS DA

wise than those of other countries, and those of those countries with which they have been associated. The county has a long history of association with the Woodstock and the Chiltern and Witney.

Antiquities. The county has a long history of antiquities, and is one of the most important in the country. The county has a long history of antiquities, and is one of the most important in the country.

"Knights" near Rollright, and the "Stone" near Steeple Barton. The stone circle of importance is situated on the county boundary near Rollright. The stones at Rollright are locally called "The Devil's Quern" and are attributed to a similar age. There are remains of early encampments at Tadmarton and on Chastleton Hill. Of the Iron Age period, there are remains of Alchester in Blenheim Park, and of another Roman road near Alchester and Donboy. In the Saxon period little has survived except in the towers of Langford Church and Caversfield Church. Of Norman architecture Illey Church is a magnificent example.

Chief Towns. The county town is Oxford (which see). Woodstock is also described in a separate article.

Banbury. A Municipal Borough and market town, with an area of 4633 acre, and a population of 13,953 in 1931; the second largest town in the county and a manufacturing centre of some importance. The cattle market is one of the largest of the Midlands. Features of interest in the town include a small fragment of the walls of the

twelfth-century castle, which was at first a palace of the bishops of Lincoln.

Chipping Norton. A Municipal Borough and market town, with an area of 2456 acres and a population of 3489 in 1931; a typical Cotswold town. The first charter was granted in the reign of King James I, and the manufacture of woollen goods and gloves which flourished from the Middle Ages is still carried on. The church is one of the most picturesque in Oxfordshire, and contains much thirteenth-century workmanship.

Henley-on-Thames. A Municipal Borough, with an area of 549 acres and a population of 6618 in 1931; best known as a boating centre. The Royal Regatta, which was instituted in 1839, is held annually in July.

OXFORD UNIVERSITY. The oldest University in the British Empire. Its origin is not clearly defined. By tradition Oxford was a centre of culture of the Druidical type, according to other authorities, it first emerged as a city of learning during the twelfth century. The earliest definite records are connected with the savant Robert Grosseteste, who gave courses of lectures at Oxford in the first half of the twelfth century. The earliest authenticated record is in connection with St. Frideswide's nunnery, which was established in the eighth century, and was noted for its learning. It was devoted to religious bodies, such as the Benedictines and Cistercians, that the definite foundation of the University occurred. University College is agreed to be the earliest college. Its foundation cannot be later than 1249. Some of that time, new colleges have been dedicated at more or less regular intervals.

The history of the University in the Middle Ages was largely concerned with the great powers which were invested in the Chancellor's Court, and the consequent ill-feeling which resulted between the University and the town authorities. The fourteenth century was notable for the widespread incidence of town and gown riots, followed by the secession of a number of undergraduates to Stamford, which for many years rivalled Oxford as the principal centre of learning in England. The powers of the University, however, were confirmed and increased by Royal Charters granted by many of the kings of England. The Great Civil War witnessed the growth of the University as a political power. In this period it espoused the Royalist cause, whereas the town favoured the Parliamentary. Its political significance is still recognized by its representation in Parliament.

As a result of the Royal Commission (1919-1926), important changes have been made. Those of greatest general interest are

that the scholarships are now awarded not on merit alone, but with regard to the financial circumstances of the candidate, and that a definite retiring age has been set for University tutors. It is commonly held that the former innovation may lead to a deterioration in the standard of scholarship.

Constitution. The chief legislative body is Congregation, composed of the executive and teaching staffs of the colleges and the University itself. Convocation, which comprises a large number of senior graduates, has a restraining influence on the decisions of the Congregation, while the Hebdomadal Council, which includes the Chancellor, Vice-Chancellor and Proctors, is the body most intimately connected with the government of the University, initiating all legislation for submission to Congregation. In theory the chief official is the Chancellor, generally a public figure elected for life by Convocation. But, in fact, the chief administrative authority resides in the Vice-Chancellor, who is elected annually, and in the proctors, who are responsible for maintaining discipline in relation to the town. The colleges are independent corporate bodies, mainly self-governing, but subject to the general University statutes. The disciplinary officer of each college is known as the Dean. The relation between the colleges is most clearly seen in the fact that instruction is given partly by the University professors and partly by the tutors of the colleges.

The undergraduates are about 5000 in number, residing partly in the colleges and partly in licensed lodgings. A residence of nine terms (generally three years) is a necessary qualification for proceeding to a degree. Most Degree Courses occupy three years, but Literae Humaniores—the combined School of Classics, and of Philosophy and History—is spread over four years. There are ten faculties. Theology, Law, Medicine, Lit. Hum., Modern History, English Language and Literature, Medieval and Modern Languages, Oriental Languages, Physical Science and Biological Sciences. In addition, there are more recent Schools of Music and of Politics, Philosophy and Economics (Modern Greats). Admission to the University, known as Matriculation, is granted after admission to a College, Hall, or Society. To obtain admission to one of these, except when exemption is granted, it is necessary to pass a preliminary examination known as Responsions. The following is a list of the Colleges in alphabetical order, with the date of their foundation (in some cases only approximate):—

All Souls, 1437; Balliol, 1263; Brasenose, 1509; Christ Church, 1546; Corpus Christi, 1517; Exeter, 1314; Hertford, 1874; Jesus,

1571; Keble, 1870; Lincoln, 1427; Magdalen, 1458; Merton, 1264; New, 1379; Oriel, 1326; Pembroke, 1624; Queen's, 1340; St. John's, 1555; Trinity, 1554; University, 1249; Wadham, 1610; Worcester, 1714.

In addition, there are two Halls, St. Edmund Hall, 1240, and St. Peter's Hall, 1929. Campion Hall and St. Benet's Hall are restricted to members of the Society of Jesus and to members of the Benedictine Abbey of Ampleforth respectively, while St. Catherine's Society comprises the non-collegiate students. Ruskin College is a labour college which has no direct connection with the University.

Women undergraduates number about 800 and have their own colleges and halls. These are Lady Margaret Hall, opened in 1879, and incorporated in 1926; Somerville College, 1879; St. Hugh's College, founded in 1886, and incorporated in 1926; St. Hilda's College, 1893; and the Society of Oxford Home Students, 1879.

OXIDATION, *ok sid ay' sh'n*. The process which takes place when oxygen combines chemically with any other substance (see OXYGEN). The compound which results from the union of oxygen with another element, or with compound radicals, is called an *oxide*. The substance to which oxygen is added is said to be *oxidized*. A good *oxidizing agent* is one that gives up its oxygen to a substance more readily than air. The substance deprived of oxygen is *reduced*. Examples of oxidation are the rusting of iron, the burning of magnesium in air, the transforming of cider into vinegar, the process of breathing, and the decay of vegetable and animal life. Oxidation may be slow or fast. Breathing, rusting and decay are examples of slow oxidation; combustion, accompanied by heat and light, is rapid oxidation. A familiar example of the latter is the explosion of gunpowder, where the charcoal and sulphur are oxidized by the decomposition of nitre. See COMBUSTION, RUST.

OXLIP. A plant of the primula species, a perennial that flowers in April and May, and can occasionally be found growing wild in woods and pastures. Its yellow flowers are salver-shaped in a stalked umbel (i.e. umbrella-like), which distinguishes them from the primrose. It is probably a hybrid of the common primrose and the cowslip.

Scientific Name. *Primula elatior*.

OXUS, now called AMU DARYA. A large river of Central Asia, rising in the plateau land at the confluence of the Pamirs and Hindu Kush ranges and flowing in a mainly north-westerly direction into the Sea of

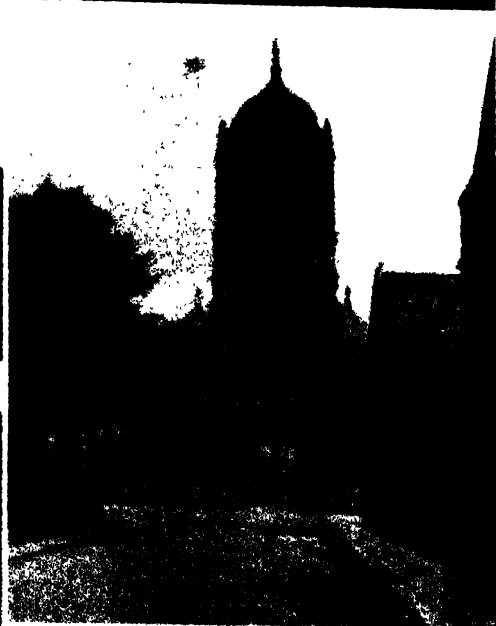
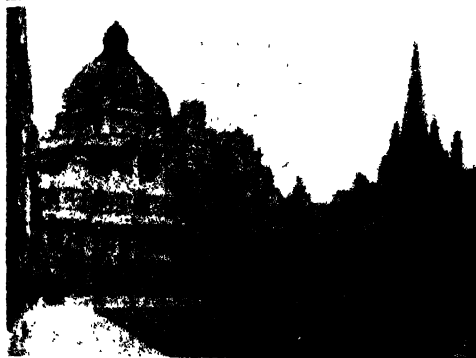
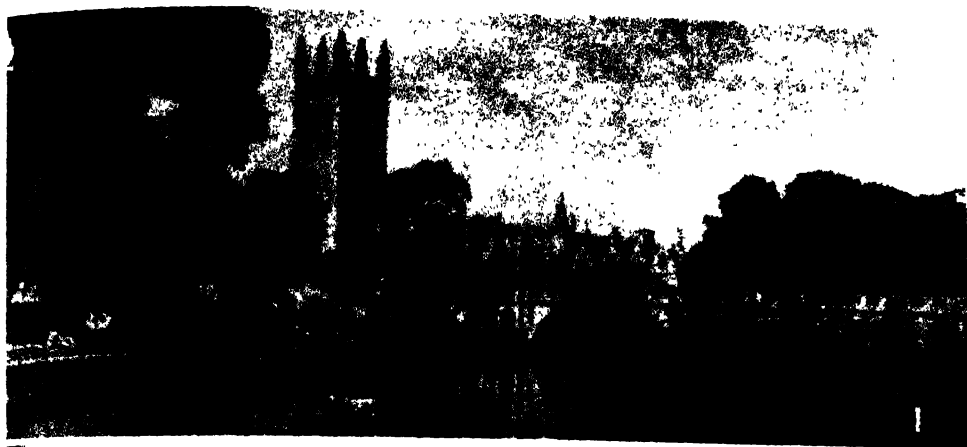
Aral. The greater part of its length of about 1300 miles is navigable by steam vessels. In ancient times it is believed to have flowed into the Caspian, and its earlier course is partly traceable across the semi-desert to the Balkan (or Krasnovodsk) Gulf on that sea.

OXYGEN, *ok'sij en*. The most abundant of the simple substances or elements. We owe the term *oxygen* to the French chemist Antoine Lavoisier (1743-1794), who, thinking that the element was an essential part of all acids, gave it a name meaning *acid producer*. By volume, it constitutes one-fifth of the atmosphere, and by weight about one-half of all the rocks and eight-ninths of water. Oxygen is combined with hydrogen in water, the molecules of which consist of 2 atoms of hydrogen to 1 of oxygen. Oxygen is a little heavier than air, and without colour, odour or taste. Its symbol is *O* and its atomic weight is 16. It is easily prepared in the laboratory by heating in a closed retort a mixture of potassium chlorate and black oxide of manganese, and collecting the gas in inverted jars over water.

How Oxygen Supports Life. If an animal or a plant is deprived of air, it dies. By respiration, the air is drawn into the lungs, where it gives up a part of its oxygen to the blood, which distributes the oxygen to all parts of the body, so that it unites with the tissues, or *oxidizes* them, and in this way the heat is produced which keeps the body at a uniform temperature. Among the waste products formed during this process is carbon dioxide, which is expelled from the system through the lungs. Oxygen thus purifies the blood.

Plants, on the other hand, take in a large quantity of carbon dioxide through their leaves and give off oxygen, but this action takes place only under the influence of direct sunlight. At night, when they are not manufacturing food, they are using oxygen and giving out carbon dioxide. See CARBONIC-ACID GAS.

Uses of Oxygen. Oxygen forms many combinations in Nature, and without it many common processes would be impossible. Fires would not burn, and many substances, such as iron and steel, could not be produced; but the pure gas was not until recently considered to be of any practical use. Oxygen is now frequently used to restore a person who has been suffocated, or one who is unable to obtain enough air, as in cases of pneumonia, asthma and croup. Divers now carry tanks filled with oxygen under pressure. Without it, submarines could remain under water only a short time. Aviators who fly to great heights are also provided with oxygen apparatus. Oxygen



OXFORD UNIVERSITY

Magdalen College. 2. The Quadrangle, Brasenose College. 3. The Quadrangle, Corpus Christi College. 4. Oriel College. 5. Tom Tower, Christ Church. 6. Christ Church.

Photos: F&B; Photopress. Taylor, G.W.A.

in the air acts as a purifier, and aids in the disposal of sewage.

For commercial purposes, oxygen is stored under great pressure in iron cylinders.



OYSTER BEDS AT CANCALE, NORMANDY
Photo: U. S. N.

When mixed with hydrogen in proportion of 2 parts hydrogen to 1 of oxygen and burned at the mouth of a tube with a small aperture, it forms an intensely hot flame (called *oxy-hydrogen*). Under high pressure and at a very low temperature, oxygen can be liquefied. For commercial purposes it is made from liquid air.

During the World War a liquid-oxygen explosive, usually referred to as L. O. X., was invented in Germany for use in industrial blasting.

L. O. X. is used in a paper cartridge filled with an absorbent material, such as lamp-black. The cartridge is saturated with liquid oxygen, and then detonated exactly like a dynamite cartridge. Because liquid oxygen evaporates rapidly, the cartridge begins to lose strength as soon as it is removed from the liquid. See OZONE.

OXYHYDROGEN FLAME. See HYDROGEN; OXYGEN, above.

OYAMA, o yah' ma, IWAO, PRINCE (1842-1916). A Japanese field-marshal. In the Russo-Japanese War (which see), he was commander-in-chief of the Manchurian army, and the great victories of the Japanese forces were largely due to his tactics.

In 1907 the Mikado bestowed on him the rank of prince.

OYSTER. Among the subdivisions of the animal kingdom, the oyster is classed with the *molluscs* (which see), a group containing animals with soft, fleshy bodies, covered usually by shells. The oyster lives in salt water, thriving best in quiet, shallow inlets.

The shell of the oyster consists of two parts called *valves*, which are fastened at one corner by a hinge. By means of a strong *adductor* muscle, which attaches the soft body to the shell, the valves can open (about 2 1/2 inch). In its natural state the oyster rests on the left valve, which is larger, thicker and more convex (or hollowed out) than the right one. Usually it attaches itself by this left valve to a rock or other object on the sea bottom, remaining fixed for life, and sometimes several oysters fasten to one another. If it is found that there are too many in a group or bed, the under oyster sinks into the mud and dies of starvation and suffocation.

Every oyster shell has a fold of muscle called a *mantle*, which grows from each side of the body. The mantle is the substance which makes up the shell.



BAGGING THE OYSTER CATCH
Photo: High Commissioner for New Zealand

layers by the mantle; the innermost layer is called *mother-of-pearl* (which see). As each layer represents a season's growth, one may judge an oyster's age by the thickness of the

shell. Sometimes a grain of sand or other hard object becomes lodged on the inside of the shell. In such cases, to protect its soft body from irritation, the oyster deposits mother-of-pearl over the object, and in due time a pearl (which see) is formed. The oysters that are famed as pearl-makers, however, are not the edible species of the north temperate zone, but are found in the tropics.

Although the oyster has no head, it has a mouth, consisting of a funnel-shaped opening at the narrowest part of the body. This mouth is provided with minute finger-like projections, which select from the sea water the myriad plant and animal organisms on which the oyster feeds. It has a good-sized stomach, which is connected with the mouth by a short gullet, a digestive gland, reproductive organs, two pairs of gills for breathing, an intestine, a dark-green liver, a two-chambered heart, and an elementary nervous system.

Oyster eggs are yellowish in colour and very minute, and the average-sized oyster can produce as many as 10,000,000 in a season. They are ejected from the parent in the form of a sort of milky spray. In about ten days after fertilization, the baby oyster, which is about the size of the point of a needle, is able to swim about by means of hair-like appendages which whip the water and are known as cilia. Within the next twenty-four hours a rudimentary shell begins to form. In two weeks it attaches itself permanently to a rock or other stationary object.

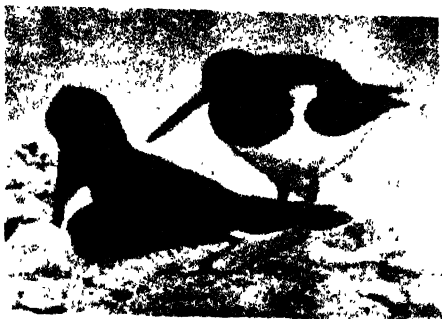
Soon the primitive shell is formed, and the creature develops into an adult oyster. In a month a young oyster is about the size of a pea, and after that it grows about an inch a year, until it reaches full size at the end of three or four years.

So many other animals prey upon oysters that they would become extinct if such enormous numbers of eggs were not produced. When larvae, they are swallowed in thousands by countless fish, and after they begin life as fixed objects on the sea floor, they are attacked by starfish, drills, rays and other marine enemies. It has been calculated that a newly hatched oyster has one chance in 1,145,000 to attain adult size.

England and Wales, France, Holland and Italy are the leading European countries in oyster production. The best known oyster beds in Britain are those of Colchester and Whitstable. The world output of market oysters is estimated at 22,000,000 bushels annually.

OYSTER-CATCHER OR **SEA PIE.** A family of wading birds found on sea coasts in most warm parts of the world. It is doubt-

ful if they feed much on oysters, but at least they are known to prise limpets off their



OYSTER-CATCHERS

Photo John Kearlton

rocks, and to open mussel shells with their sharp-edged chisel-shaped bills.

Scientific Names. The oyster catcher is *Haematopus ostralegus*. The commonest species is *ostralegus*.

OYSTER PLANT, OR SALSIFY, *Trapa*

A lacinnial garden vegetable with a thick root, has an oyster-like flavour. The plant is native to Mediterranean countries, but is well adapted to the soil and climate of many parts of the northern hemisphere. The tapering roots are used in Europe and America as a table vegetable. Salsify is cultivated in the same manner as the well-known parsnip, and the roots are easily kept over winter, either in the ground or stored in cool, moist earth.



OYSTER PLANT

Scientific Name
The oyster plant (a) Root, (b) Fruit, (c) Flower
is classed as *Trapa*
trapa *portulacastrum*, of the family *Compositae*

OZOCERITE, *o zo' ser ite*. A solid mixture of hydrocarbons found in U.S.A., Galicia and Turkistan. When purified, it yields ceresin (used in candle manufacture), and when dis-

tilled, oils used for lubricating or burning, paraffin wax, and coke.

OZONE. A form of oxygen which is more active, more concentrated and heavier than ordinary oxygen, and which has a pungent odour resembling chlorine. Ozone is an allotropic form of oxygen (see ALLOTROPY). In Nature it is produced chiefly by lightning, silent electrical discharges from thunderclouds, and by the action of the ultra-violet light of the sun on oxygen in the upper air. The odour of ozone is perceptible after a thunderstorm, when the air seems purer and more invigorating. On an average, however, there is more ozone in the winter atmosphere than in summer air, because it decomposes quickly under conditions of heat and moisture.

It has been estimated that ozone exists in country air in the proportion of one part in 450,000. Over cities, where the air is full of

organic matter, ozone readily changes to ordinary oxygen because it is constantly oxidizing the organic substances, that is, giving oxygen to them. A molecule of ozone contains 3 atoms of oxygen; a molecule of ordinary oxygen is made up of 2 atoms. In the oxidizing process, 1 atom of oxygen is withdrawn from the ozone molecule. Ozone is one of the most powerful oxidizing agent known.

Ozone is prepared for commercial purpose by passing a silent electrical discharge through oxygen or atmospheric air. The apparatus used is called an *ozonizer*. Three volumes of oxygen are condensed to two when ozone is formed. The gas is employed in the bleaching of dyestuffs and fabrics, to free impure air of bacteria, and for purifying water-supplies. It has the advantage of leaving behind no injurious products after any chemical activity. See OXYGEN.

THE WORLD BOOK

Pp

P. The sixteenth letter of the English alphabet. It was derived from the Phoenician *pe*, through the Greek and Latin, but the form has changed considerably. The Phoenician name meant "mouth."

The Greeks changed the form and the

Romans altered it still further, making of it the modern capital *P*.

In sound it has remained constant, having possessed always the plosive character which it has to-day. Occasionally it is silent, as before *s* and *n* in such words as *psalm* and *pneumonia*, and it is used in one combination, *ph*. This is really an unnecessary digraph, as *f* represents the same sound, and some words are correctly spelled in either manner, as *fantasy*, *phantasy*.

7

PACIFIC ISLANDS. Scattered throughout the south western part of the Pacific Ocean are thousands of islands, known collectively as OCEANIA or the SOUTH SEA ISLANDS. They are generally divided into three groups, viz. —

Melanesia, in which are the Bismarck (formerly New Britain) and Solomon Archipelagos, north-east of Australia.

Micronesia, a scattered group lying chiefly north of the equator between the Philippines (on the west) and the 180th meridian.

Polynesia, a large group lying east of the 180th meridian.

Most of the islands are of volcanic origin and rise from submarine platforms, coral reefs fringe nearly all. Some are mere rings of coral, these atolls are very low. Only a few of the smallest are uninhabited, and even they are occasionally visited by pearlers. A warm and equable tropical climate is the rule, but from time to time violent hurricanes do great damage. Fishing is the chief occupation. White men frequent the islands chiefly for pearls, copra and sandalwood. In Melanesia the population is mainly negroid; in the other islands chiefly Polynesian. Nearly everywhere the number of natives is decreasing.

The islands nearer the coast of Asia, notably Sumatra, Java, Borneo, the Celebes, Fiji, Samoa, and Papua, or New Guinea, are not classed with the lesser Pacific isles, and are described in separate articles in these volumes.

The chief islands or sub-groups composing the Pacific Islands are as follows—

Bismarck Archipelago. See NEW BRITAIN ARCHIPELAGO, below.

Caroline Islands, a group of small islands, approximately 549 in number, lying south-east of the Philippine group, and north of New Guinea. Until 1914 they were owned by Germany, who bought them from Spain in 1899, but since the World War are mandated to Japan. Yap is the best known of the group, with a population of 6725 (1933). The total population is 26,332. The chief export is copra.

Cook Islands. See separate article.

Easter Island, lying about 2000 miles west of the coast of Chile, is 13 miles long and 7 miles wide. It was so named because it was discovered on Easter Day in 1722. It is famous for certain images and stone carvings representing men from their waist upward, remnants of the culture of a race which has disappeared. The present inhabitants are Polynesians, and they number about 300. The island belongs to Chile.

Fiji Islands. See FIJI.

Friendly Islands. See TONGA ISLANDS, below.

Gilbert and Ellice Islands. See separate article.

Guam, the largest of the Mariana Islands, mountainous though fertile. It is a U.S. naval station. Area 225 sq. miles, population (1930), 20,301.

Ladrones. See MARIANA ISLANDS.

Lord Howe Island, in latitude 30° 30' longitude 159° 5' E, is a dependency of New South Wales. It is a two-peaked volcanic island of about 5 square miles in area. Much

of the island is very fertile, and the climate is warm and damp. The population of 161 grow the seed of the *Kentia* palm for export.

Malden Island, in latitude 4° S., longitude 155° W., covers 35 square miles. The climate is warm and dry and the island is inhabited only for the digging of guano. It is, however, best known for its ruins of ancient temples of unknown origin. One of the Line Islands, it is a British possession.

Mariana Islands. See separate article.

Marquesas Islands, eleven in number, have

New Hebrides. See separate article.

Norfolk Island. See separate article.

Phoenix Islands. A group of eight coral islands, lying just south of the Equator in longitude 171° - 174° W. on one of the main trade routes from Australia to North America; area 8 sq. miles, population about 60. There is little cultivation. The islands were annexed by Britain in 1889-92, and possession was reaffirmed in 1936.

Pitcairn Island. See separate article.

Samoa Islands. See SAMOA.



VILLAGE IN FIJI

Photo: Harbert

a total area of 480 square miles. They have been a French possession since 1842, but are of no great value, the number of inhabitants being only about 2300. The Marquesans have more or less adopted the customs of civilization and the teachings of Christianity. Breadfruit is the chief article of subsistence.

Marshall Islands. See separate article.

New Britain Archipelago (officially known as **BISMARCK ARCHIPELAGO**). Germany owned the group from 1884 until they were taken by the Allies in the World War and mandated to Australia by the League of Nations in May, 1921. The Bismarck Archipelago lies north-east of the island of New Guinea. Population of about 130,573.

Several of the islands are large and little known. The total area is nearly 20,000 square miles.

New Caledonia. See separate article.

Society Islands, of which Tahiti is the best known; this archipelago, in the South Pacific, has been a colony of France since 1880. It lies directly east of Australia, about midway between that continent and South America. The total area of the group is about 650 square miles; the largest island is Tahiti, with 600 square miles. The population is estimated at about 10,000, and four-fifths of this number are on Tahiti. All tropical fruits grow in abundance. The chief town, and the capital of all French establishments, is Papeete, on Tahiti, with a population of about 7000.

Solomon. A group of seven large islands of volcanic origin, and smaller ones which are of coral formation. They lie slightly south-east of New Guinea, near the Bismarck Archipelago, and have an area of about 4100 square miles. The larger islands are





SOUTH SEA ISLANDERS

1 and 4. Natives of Fiji. 2. Samoan girl. 3. Samoan Taupou and chief, in gala dress.
 Photos: Union Steam Ship Co., New Zealand. The Trans Pacific Passenger Agency, Ltd.

very mountainous, the highest peak being 10,170 ft. above the sea. They are little explored. The British Islands have a native population of 93,415. The former German possessions of Bougainville and Buka were mandated after the World War to Australia. The native population of the island was 41,111 in 1930. Chief exports are copra, cocoa and birds of paradise.

Tahiti. See SOCIETY ISLANDS, above.

Tonga, also known as FRIENDLY ISLANDS, an archipelago lying near Fiji and Samoa. In 1886 they were constituted a neutral kingdom, but four years later they passed to Great Britain as a protectorate, though the native kingdom is still recognized by Britain. Of the population of the group, estimated at 31,589 (1934), all but 1180 are native Tongans. These are scattered over 385 square miles of territory, but half of the people live in one-third of that area. Copra is the chief export. The Tongans are among the most civilized of the Polynesians. The name Friendly Islands was given by Captain James Cook.

Tuamotu, Paumotu or the Low Archipelago lies between latitude 13° and 15° W. and latitude 12° and 22° S. There are many low atolls and reefs. The total population is about 4700. Copra and pearling are the chief interests. Most of the islands belong to France.

PACIFIC OCEAN. The greatest of the oceans, a body of water which occupies more than a third of the entire area of the earth and comprises about half its water surface. It lies between America and Asia and Australia, and stretches from the Arctic on the north to the great ring of shallow water known as the Southern (or Antarctic) Ocean. Moderate winds favoured Magellan—the first European to explore its vast expanse—on his pioneer cruise, and he chose to call the ocean the *Pacific*.

The area of the Pacific has been estimated at about 71,000,000 square miles. It is broadest at the equator, where it measures 10,000 miles from east to west. Its greatest length from north to south is about 7650 miles. Its depth is greater than that of the Atlantic, the average reading being about 2530 fathoms (15,180 ft.). The deepest place thus far discovered is near Mindanao, one of the Philippines, the soundings showing a depth there of 34,416 ft., or more than six miles. There are seven other known depths each of over 30,000 ft.

The bed of this ocean may be regarded as a sunken plain, dotted here and there, especially in its western part, with plateaux, volcanic islands, coral reefs and atolls. Some of the plateaux emerge to form islands like Australia. The area of the trade winds is

less clearly defined than in the Atlantic. The north-east trade wind remains throughout the year within the northern hemisphere, but the south-east trade wind advances beyond the equator. In the China Sea typhoons are frequent.

The American shore-line is fairly regular, being broken by only one considerable gulf—that of California. On the west, it is much more uneven, being broken by the China Sea, Yellow Sea, Sea of Japan, Sea of Okhotsk, etc. Balboa discovered the Pacific in 1492, but Magellan was the first westerner to cross it (1520-21).

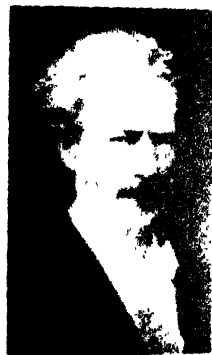
PADDLE-WHEELS. Wheels fixed on each side of a vessel, which, as they rotate, drive the vessel through the water. Since all paddle-wheels of recent make are constructed with feathering floats, they revolve slightly, thereby giving greater propulsion through the water. Paddle wheels are not used for ocean going steamers, but only for smaller of the river and channel steamers.

PADDY. Rice enclosed in its hull.

PADEREWSKI, Pader eff she (Sip Paderewski) (born 1860). A Polish composer and pianist. After achieving world-wide fame in his art, he temporarily abandoned it to devote his energies to the cause of Polish freedom during the World War. He was born in Podolia, Russian Poland, the son of a gentleman farmer. At 16 he was giving concerts, sometimes playing his own compositions, and at 18 became a professor in the Warsaw College of Music. About six years later, he was given a similar position in the Konservatorium at Strassburg.

After special training in Vienna under well-known teachers, Paderewski, in 1884, began his series of concerts in the chief cities of Europe and America. In 1899 he married Baroness de Rosen, and afterward spent much of his time in Poland. Among the best of his compositions are "A Love Song" and "Night Song." In 1902 his opera *Manru* was produced. Of various other compositions the "Minuet" is probably the most famous.

During the World War, he put aside music, and when in 1918 Poland declared its independence and Pilsudski became Dictator and provisional President, Paderewski was made



PADEREWSKI
Photo from *Life*

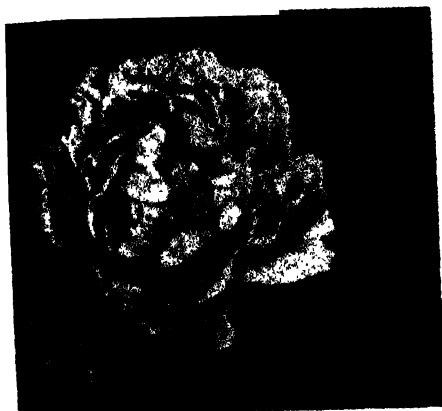
first Prime Minister, his conservatism being relied upon as a safeguard against radical tendencies in the new government. At the Peace Conference he put the case for the recognition of Polish independence and integrity, so that eventually Poland's boundaries were fixed by the Versailles Treaty (1919) practically as they stand to day.

After two years in politics, Paderewski retired to his estate, returning to the concert platform in 1922. In 1925 he was knighted by King George. His wife died in 1934.

PADISHAH OR PADSHAH. A title, of Persian origin, meaning Lord King or High King. It was assumed by the Mogul Emperors of Hindustan, and is now applied to the King of Great Britain, as Kaisar-i-Hind or Emperor of India.

PADUA, officially **PADOVA.** See **ITALY.**

PAEONY. The name of a genus (*Paeonia*) of hardy herbaceous perennials belonging to the natural order *Ranunculaceae*, natives of Southern Europe, Asia and the Western parts of North America. These plants are



PAEONY

Photo: Visual Education Service

among the most showy of garden flowers and have been cultivated in England since the introduction in 1548 of the two common species, *P. albiflora*, a native of Siberia, and *P. officinalis*, a South European form. Since that time, improvements have been made in these two types and other species have been introduced, resulting in numerous varieties and hybrids with handsome foliage and beautiful flowers of varied colours. In addition there is the Tree Paeony (*P. moutan*), a tall shrub 10 to 12 ft. in height, a native of China and Japan, where it is known as *meu lang*, the king of flowers. The paeonies require a good rich loamy soil and are propagated by division of the roots after flowering, and new varieties by seeds. The

tree paeony and its varieties are increased by grafting scions on stocks of the common herbaceous species.

The name, Paeony, is derived from Paeon, an old Greek physician who is said to have discovered various medical qualities in the plant.

PAGANINI, *pag a ne' ne*, **NICOLÒ** (1784-1840) Italian violinist, born at Genoa. In 1797 he began his concert tours.

Paganini's life, once his fame was established, was a combination of artistic triumphs and personal excesses. His genius as a player overshadows his work as a composer. He left a number of compositions for stringed instruments, and these reveal his supreme mastery of technique.



PAGANINI
Photo: Visual Education Service

PAGE, **WALTER HINES** (1855-1918) American ambassador to Great Britain during the period of the World War. He was by profession an editor and publisher. He founded several journals and reviews, including the *State Chronicle* of North Carolina, and among those which he edited for a time were *The Forum*, *The Atlantic Monthly*, and *World's Work*. He was a member of the publishing firm of Doubleday, Page and Co. (New York). Page was sent to England as ambassador by President Wilson in 1913, and did much to prepare American opinion for the entry of U.S.A. into the War.

PAGEANT. A spectacle, usually historical, produced in the open. In the fourteenth and fifteenth centuries, pageants consisted of scenes played on raised stages built upon wheels, and conveyed in processions to "stations" for performances. Occasionally the pageants were played in dumb show while the procession was taking place, but usually the plays were produced at intervals or at the end of the procession. These pageants were played regularly all over the country, those at Coventry and York being specially famous. Control was exercised by the Corporations, but the guilds or crafts were responsible for the scenes. Members of the guilds were frequently compelled to contribute towards the costs. Modern pageants are played upon a much larger scale. Usually the scenes depict the main events in the history of a town and are acted in costume.

PAGET, FAMILY OF. This family was ennobled by Henry VIII in 1549 when Sir William Paget, K.G., was made Baron of Beaudesert in return for his services as the king's chief adviser. Among his descendants were Thomas, third Baron, attainted in 1587 for complicity in Spanish plots; William, fourth Baron, a Protestant, to whom the estates were restored by James I; William, fifth Baron, who fought on the royalist side in the Civil War, and whose lands were afterwards sequestered; and



KYAITTEYA PAGODA, ON A MOUNTAIN IN BURMA
Balanced, according to tradition, by a hair
of Buddha
Photo: U. & U.

William, sixth Baron, who was William III's ambassador to Vienna and Turkey.

From the fifth Baron was descended Sir Henry William Paget (1768-1834), who became the first Marquess of Anglesey and second Earl of Uxbridge (of the second creation). He fought in the Peninsular War and commanded the cavalry at Waterloo, where he lost a leg. Later he became Lord Lieutenant of Ireland. Among the sons of the first Marquess of Anglesey were Admiral Lord Clarence Paget, who commanded the Mediterranean fleet (1866-69); General George Paget, who served in the Crimea and took part in the Charge of the Light Brigade at Balaklava; and General Lord Alfred Paget, clerk marshal of the royal household from 1846-88.

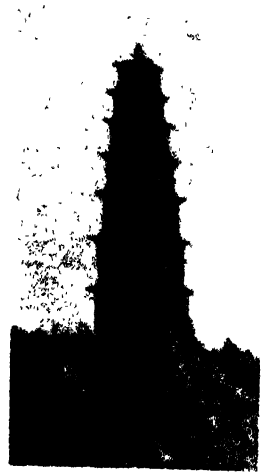
Another stem of the Paget family is represented by Henry, first Earl of Uxbridge, who was created privy councillor in 1711, and his grandson Henry, second Earl of Uxbridge.

PAGODA, *pa go' da.* A kind of tower, which in India is connected with the worship of Buddha. Such towers are often of ornate design. The Hindu pagoda may be either a decorative adjunct to the temple, or it may be an independent shrine.

In China, where there are probably 2000 of these towers, the pagoda is often a memorial building. The typical Chinese pagoda is an eight-sided structure of many stories, and with peculiarly curved roofs. Brick, glazed tile and porcelain are commonly used for building material. While not so ornate as the Hindu pagodas, they are often decorated with ivory, bone and stone work. The Japanese also have pagodas, used in connection with temple worship. They are usually built of wood.

PAHANG, *pa hang'.* One of the four governments of the Federated Malay States (which see).

PAINÉ, THOMAS (1737-1809). A political and philosophical writer, born at Thetford, Norfolk. He attempted to earn a living as



CHINESE PAGODA IN
YEARS OLD
Photo: ORU



PAGODA AT CHIENGMAI, SIAM
Photo: ORU

stay-maker, exciseman, preacher and tobaccoist, but on becoming acquainted with Benjamin Franklin, he was influenced to remove to America in 1774.

After a varied political career in U.S.A., he returned to Europe in 1787, spending some time in France, and later coming back to England. Here he published (1792) his *Rights of Man*, a reply to Burke's attack on the French Revolution. This made him exceedingly unpopular with Tories, but won him great favour in France, whither he had gone after the publication of the pamphlet, and he was elected a member of the French National Convention. His opposition to the execution of Louis XVI offended the radical party in the Convention, and he was excluded from that body and arrested. During his imprisonment, he worked on the second part of his *Age of Reason*, the first part of which was published in London and Paris just after his arrest.

In 1802 Paine returned to the United States, but took little further interest in politics. The latter part of his *Age of Reason*, however, was published during this period and aroused much controversy.

PAINLEVÉ, *paN' lèvèh*, PAUL (1863-1933). A mathematician who, at the age of 36, had been the youngest member of the Institute of France, Painlevé became a Deputy for Paris in 1910. During the World War he headed the Inventions Commission, in 1915 he became Minister of Inventions and in 1917 Minister for War. In the September of that year he became Premier. His month in office saw the creation of the Supreme Allied Council of Versailles and Lloyd George's formal pledge that Britain would make no peace which left Alsace-Lorraine in German hands. He continued to play an important part in French politics, and in 1924 united the Socialists and Radical-Socialists. In 1925 he accepted the Premiership and Ministry of War; the former was lost to him owing to financial and colonial difficulties, but he held the latter in Poincaré's National Government and also under Poincaré and Briand in 1928 and 1929. He became Air Minister the year before his death.

PAINT. Paint consists of a colouring-matter termed the *pigment*, mixed with a liquid, the *vehicle*. Most pigments are mineral substances, such as white lead; zinc white; ochre, which consists of clay coloured with an oxide of iron; the lead chromate and cadmium compounds, which are yellow; the lakes of various colours, consisting of some such mineral substance as clay coloured with a dye; compounds of cobalt, which produce blue; and umber and sepia, which are brown. Carbon, in the form

of lamp-black or bone-black, forms the basis of black paints. Indigo comes from a plant, and cochineal, from which carmine is obtained, from an insect.

Linseed oil (which see) is the vehicle most widely used for oil paints. The oil is usually heated to a high temperature, and a small quantity of lead oxide is added. The "boiled oil" thus produced dries quicker than the "raw," or unboiled. An oil paint contains a *solvent*, usually turpentine, to make the colour spread easily, and a *drier*, usually a compound of lead and manganese, to hasten the drying process. Paints mixed with water are called *water-colour* paints.

Fireproof paint contains boric acid or powdered glass, which is melted by the heat and forms a protective glaze. *Luminous* paint contains some compound of phosphorus.

PAINTING. More than 10,000 years ago the cave-dwellers of the Dordogne valley in the South of France drew pictures of animals, amazingly realistic in structure and movement, on the walls of their caves. Later on, it was discovered, pottery afforded curved surfaces for geometrical and highly stylized animal patterns. Thus, on the fascinating cups, dating from Sumerian civilization, attenuated running dogs and a procession of birds form uniquely ornamented borders. In Mediterranean lands, long before our era, palaces and houses were decorated with astonishingly virile paintings, and an amazed world beheld the Minoan frescoes, over 3000 years old, which Sir Arthur Evans excavated at the beginning of this century. Later, the beautiful proportions of the classical Greek vases gave painters an opportunity to reveal their skill and refinement, and an artist like Polygnotus seems to have overcome every difficulty of foreshortening even on the most complicated curves of vases. Of the artists Apelles and Parrhasius there survives no painting, but much praise from antiquity. The excavations at Pompeii and Herculaneum reveal, every year, walls covered with paintings, some highly stylized, some executed with great realism. These mural decorators showed ingenuity in fitting their designs in wall panels. Painting, the first few centuries after the State recognition of the Christian Church, became slowly emancipated from the ideas and styles of the Roman painters, and the Western Church derived many artistic ideas from the East.

Byzantine. This style reveals deliberate suppression of freedom of handling; and Christ, the Apostles and the Madonna are awe inspiring and remote. A touch of tenderness was rare, and yet the best examples were eminently suited for their purpose—the impressive decoration of Byzantine basilica churches, which repre-

sented the ever-growing power of the Church better than the emotional profundity of Western Christianity. Yet, at the end of the thirteenth century, this style was effete.

Florentine (first period). Cimabue, who painted in Florence and Assisi, and his great pupil Giotto (1266-1337) ushered in the earliest renaissance in painting. Giotto introduced Nature, and his frescoes in the upper Church of St. Francis at Assisi display a unique balance between the vividly told story and the actual composition. He suggested roundness and depth, and created a vigorous standard for succeeding generations of Florentine painters.

Siennese. The Siennese painters, the greatest among them being Simone Martini (1283-1344), were endowed with poetic fervour and rare tenderness, but they never won that command over form which gave the Florentine achievement its lasting influence. By 1400 the genius of Siena was spent and had nothing new to utter.

Florentine (second period). The fourteenth century saw the gradual disappearance of feudalism, and the rise of the big bankers in Florence. New demands were made upon the art of the brush. Greek ideals and canons of beauty replaced Gothic expressionism. Yet the simple beauty of Fra Angelico deliberately clothed itself in an archaic style. Occasionally one may grow a little weary of his demure virgins and sinless angels, but his superb frescoes, such as the "Flight into Egypt," belong to the masterpieces of the age. The patronage rich families gave to artists freed them from the purely religious subject-matter. Masaccio (1401-1428) painted the nude Adam and Eve on the walls of the Brancacci chapel. Great painters arose whose frescoes beautified churches, monasteries and private houses in Florence. Ghirlandaio's (1449-1494) charming worldly frescoes in the choir of the church of Santa Maria Novella reveal his decorative qualities, while his numerous portraits of great Florentines of the fifteenth century prove his innate sense of elegance.

Botticelli's (1444-1510) unrivalled beauty of line in the world-famous pictures "The Birth of Venus" and "Primavera" in the Uffizi was never approached until, in the last century, a master decorator like Aubrey Beardsley used the line equally effectively. Botticelli expressed the ideals of his age, and they were Greek rather than Italian, with a unique sense of line and form. He created a new type of wistful, nervous beauty. His women, whether Venuses or Madonnas, were enveloped in the sad twilight of those who cannot face their own age, and glorify only the past.

In Leonardo da Vinci (1452-1519) the Renaissance reached its culmination. His was a unique intellect, which inspired his searching quest for new possibilities in the emotional rendering of the pictorial, which gave to the world the "Last Supper" in Milan, the eternal enigma of the feminine "Mona Lisa," and the "Virgin of the Rocks." With an all-embracing activity, he sought to compel his astounding craftsmanship to recreate the illusion of life and the suggestion of the flux of Nature on the painted surface. His diary in the Ambrosiana Library in Milan reveals a master intellect and an ardent student of the ultimate questions in art.

Michelangelo (1475-1564), although pre-eminently a sculptor, painted, without assistance, the gigantic frescoes of the Sistine chapel in the Vatican. From the creation of the World and Man to his downfall and destruction—so poignantly told that we feel an infinite tenderness for this weak yet loving and self-sacrificing being to his covenant with God and his fresh distance in the "Drunkenness of Noah," we follow our own eternal fate, and are almost as much on the side of the sinner as on that of the punishing Divinity. Majestic sibyls and prophets, corresponding events from Jewish history, the great groups of the ancestors of the Mother of Christ, all of them fast-telling man's final redemption through the Messiah form part of this vast drama, only comparable with Dante's *Divina Commedia*. Youths of uncanny beauty, forming connecting links in the overwhelming vastness of the design, leave us wondering how much Michelangelo, that lonely, brooding figure, knew about the subconscious forces of life. Popes and princes, while dimly realizing the outstanding genius of Michelangelo, preferred Raphael (1483-1520), the gentle Umbrian, who, beloved by all, walked his victorious path as one of the most unusual eclectics. Gleaming knowledge from every master of his age, he transformed all his eyes and mind could retain by the fire of his own imagination. Although he is best known as the creator of the "Sistine Madonna" in Dresden, and the very human open-air Madonnas of Paris and Vienna, his reputation as a master designer rests upon his "Stanze" in the Vatican. Here he decorated surfaces, difficult to manage, with stories from the Christian and Greek worlds of thought, and set the standard of their pictorial images for every cultured European.

Central Italian art had now practically spent its intellectual and emotional forces. Although Andrea del Sarto (1486-1531) in Florence and Correggio (1494-1534), the



THE "CARD FLAVER" IN LICA VAN LINDEN

"Pawn of the Renaissance," in Parma, added lustre to the Central Italian achievement through novel treatment of light and shade (*chiaroscuro*), the general decline began. The seventeenth-century schools of art in Central Italy lacked vital inspiration; display of skill became a subterfuge of the mediocre.

Venetian. In the meantime Venice, once famous for her skilled workers in mosaic, still tending towards barbaric splendour, as the Demidoff altarpiece by Carlo Crivelli (1450-1493?) in the National Gallery proves, made fascinating additions in the emotional use of colour. Gentile Bellini (1426-1507), Giovanni Bellini (1428-1516), and Carpaccio (1450-1522) placed music-making angels at the foot of the thrones of their handsome Madonnas, surrounded by benign saints, bathing their dreamy visions in a golden light. There is a story that Bellini learned the secret of oil painting from Antonello da Messina. Whether true or not, the fact remains that Giovanni Bellini gave up the use of tempera and employed oil, which quickly became the vogue in Venice. Giovanni painted one of the most searching character-studies of his age, the portrait of the "Doge Loredano," now in the National Gallery. The large second L of his signature

clearly stands out on the white card at the foot of the picture, and is the proud sign of the authenticity of this picture.

Giorgione (1477-1510), who died in youth, perfected the emotional quality of colour, and interpreted the paganism of the Renaissance in the Venetian fashion. None of his pictures can be given definite titles; had he lived in Whistler's day he would have called them nocturnes. All activity is lacking in them, only the idyllic and melancholic mood of certain poetry and music is interpreted. Though the authenticity of many works attributed to him is doubted, except for his "Tempest" in the Giovanelli Palace in Venice and his "Castelfranco Madonna," such works as the "Fête Champêtre" in Paris, the "Concert" in Florence, and that remarkable portrait of a young man in Budapest, undeniably bear his stamp.

Titian (1477-1576) began his career in the style of Giorgione. His long spell of life gave him a chance to go through every phase of artistic development, from youthful romance to the simplified mellow vision of wise old age. Such pictures as "Bacchus and Ariadne" in the National Gallery and "Sacred and Profane Love" in the Borghese Gallery in Rome, show him at the height



WILTON DIPTYCH
Early English.
(Tate Gallery)



"Arnolfini and His Wife."

(National Gallery)

LEONARDO DA VINCI
"Virgin of the Rock"

of his mature development. He lacked the impatience of the Florentines, but the spontaneity with which he set down the vital beauty of the human form, the glowing atmosphere of a sunlit landscape, was a new revelation to the world. Yet it was in his last works, like the Munich "Christ Crowned with Thorns"—that gripping drama of brutality and dignified sorrow, his "Pieta" in Venice, and the touching little "Madonna and Child" in the Mond Bequest of the National Gallery, that he interpreted the mood of the subject with a masterly control of touch and minimum of effort.

With Paolo Veronese (1528-1588) and Tintoretto (1518-1594) the sixteenth century of great Venetian achievement ended. The latter mastered the whole range of painting—foremost among his achievements is the gaining of dramatic intensity through values in light and shade and the resonance of colour. The use of diagonal lines in the building up of his compositions increased the illusion of movement. With his less gifted imitators began the Baroque period, which broke all the laws of harmony and balance which the Renaissance had preached.

Flemish. The Latin heritage of the Italian artists gave them a fine feeling for form and

rhythm. The Greek influence to which it had been exposed explains their love of beauty. Like all Northerners, the Flemish artists received their impetus rather in dramatic interpretation of life than in beauty. Not generalization but not individualism was their gospel. Book illumination had given them an early love of the charm of details, whereas the free spacing in fresco painting had been the chief teacher of the Italian artists.

Hubert and Jan van Eyck perfected the oil medium, and could thus, from the very first, go farther with this medium, which is so much more pliable than the tempera of the Italians. Hubert van Eyck (1377-1426), the romantic who loved to interpret the mood of Nature, began, and Jan (1399-1442) completed, the great polyptych of St. Bavon in Ghent. The realist Jan has left us powerful portraits in which the beauty of the treatment reconciles us to the shock of his unmitigated realism.

Roger van der Weyden (1399-1464) was the first Flemish painter to travel in Italy, but fortunately he returned with his Flemish vision unimpaired. His statements of emotional expression border at times on the uncontrolled pouring out of feelings he



Right-hand

PLEMBRANDT LEANING OVER A SEAT



From left

THE LAUGHING CAVALIER

is an intense Flemish realist who does not temper sorrow and grief.

Memling (1430-1491), the gentle creator of all those masterpieces in the Hospital of St. John at Bruges, radiates a blithe charm, free from all vulgarity, that becomes at times monotonous. All that is exquisite in life he rendered even more poetical and fragrant, avoiding high lights and shade, and relying solely on the use of colours. Such works as the "Shrine of St. Ursula," "The Adoration of the Magi," and the rich double triptych of 1491 in Lübeck put him on a level with the great masters of pure colour.

Gerard David (1460-1523), the creator of the fine triple altarpiece in Bruges, and the lovely miniature designs for the Grimani Breviary at Venice, retained his Flemish vitality, but the succeeding masters were smitten with the Italian manner, and not being able to digest it entirely, they merely became Italianized. We have to wait until the advent of Rubens before the complete assimilation of Italian principles is achieved.

Rubens' (1577-1640) unique vitality made him eminently suitable as champion of the Baroque ideals. He admired his countryman Pieter Breughel (1530-1569) the Elder, whose pictures are intense with primitive peasant vigour. Rubens employed an army of pupils in his workshops, whom he trained as assistants in the carrying out of the immense commissions that flooded his studio. Although he is known to the world as portrait and subject painter, his natural inclination was towards landscape painting. "The Honeysuckle Bower" in Munich, "The Judgment of Paris" and the "Chapeau de Poul" in the National Gallery, and his twenty-one huge paintings of the life of Marie de' Medici and Henry IV of France, bear the stamp of a genius with rare insight into the poetical possibilities of light and atmosphere. In popular opinion he is somewhat gross, but the rich warm tints of some of his finest paintings have a stimulating vitality. He freed himself from classical and academic tradition, and painted movement and action with compelling vigour.

His pupil, Van Dyck (1599-1641), court painter to Charles I, and portraitist of his consort Henrietta Maria and their children, was refined and aristocratic, but lacked the vigour of his master. Windsor holds his "Children of Charles I," the Louvre the king's most characteristic portrait, the Wallace Collection the stately portraits of Philip le Roy and his wife, and Munich the immortal portrait of Mary Ruthven, Van Dyck's wife.

German. While Germany produced excellent craftsmen who worked diligently accord-

ing to the high standard of their guilds, whose woodcuts and etchings developed independently of the graphic arts, she had few great painters. Stephen Lochner, who died in 1451, of the Rhenish School, Conrad Witz and Martin Schoengauer of Colmar (1450-1491) are each typical representatives of the warm homeliness of German



GIOVANNI BELLINI
"Doge Loredano."
(National Gallery)

art. Mathias Grünewald (1475-1530) the last volcanic eruption of the Gothic movement, depicted with gripping intensity the sufferings and joys of the Madonna in his "Isenheim Altarpiece." Albrecht Dürer (1471-1528) of Nuremberg represents the new spirit of the renaissance and humanism in Germany. His inquisitive spirit grasped the laws of Italian composition, but did not slavishly apply them. Whether he painted a hare in a field or a powerful portrait, his observation of Nature was equally keen and earnest. The National Gallery possesses the Portrait of his Father, Berlin some outstanding masterpieces in portraiture, Munich his famous panels of the four Apostles, and Sir Herbert Cook, at Richmond, Surrey, his "Madonna of the Iris."

Hans Holbein the Younger (1497-1543), the friend of Erasmus and Sir Thomas More, the much-appreciated court painter of Henry VIII, created some of his finest portraits in London. His reticent and refined

genius produced such masterpieces as the "Duchess of Milan" in the National Gallery, "Jane Seymour" in Vienna, the "Writing Erasmus" from the Louvre and the "Madonna of the Burgomaster Meyer" in Darmstadt. The Windsor Library is rich in his subtle yet very simple-looking drawings of men and women. He laid stress rather upon line than on mass.

The seventeenth and eighteenth centuries were barren for German pictorial art. The

the Gothic stage, Spain was under Flemish influence. In the sixteenth century, men like Morales and Luis de Vargas gave Spanish efforts in painting some significance, but the genius of Spain was only set aflame in the seventeenth century.

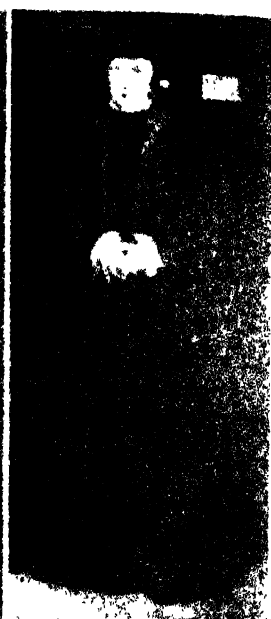
Velazquez' (1599-1660) untiring brush recorded the master's ever fresh visions of the dull features of the members of the house of Hapsburg. The Prado in Madrid maintains and all the principal galleries in Europe



AUGUSTUS JOHN
"The Sealing Woman"



VINCENT
"Lord Ribblesdale."
(Tate Gallery, National Gallery)



J.M.W. TURNER
"Christina, Duchess of Marlborough"

religious conflict of the Thirty Years War blotted out all art tradition.

At the beginning of the nineteenth century love for the Primitives was in the air. A group of German artists who called themselves "Nazarenes" sought, like the Pre-Raphaelites in England, the fulfilment of art in the imitation of the Primitives. Many were devout Catholics, but they could not recapture the genuineness of the religious feeling of the primitive painters.

The impressionistic school produced men like Corinth and Liebermann. The latter's powerful self-portrait was bought by the Tate Gallery. His death in 1935 robbed Germany of her greatest exponent of impressionism.

Spanish. Illuminated religious missals and unrecognizable wall paintings are all that is left of the earliest Spanish efforts. During

hold examples of his art, with its impressionistic methods and visions two centuries before the advent of the Impressionists in France. He and the Dutch Franz Hals were "painter's painters." Velazquez had the supreme gift of realizing colour values in the depth of atmosphere and harmonizing these into fine unity. He cast all academic ideals aside and created his own pictorial interpretation of ordinary life, from the frying of an egg to the stately ceremonial of the Spanish Court. The Spanish soil seemed favourable to fanaticism in various directions, and the inclinations of El Greco (1548-1614), the unique painter of Greek origin, bore their full fruition in Spain, where he produced works that foreshadowed the expressionists of the twentieth century. Murillo (1617-1682), whose innumerable religious paintings often lacked versatility of



invention, enchants the eye with renderings of Spanish street urchins, and his "Flower Girl" of the Dulwich collection is a delightful example.

The direct heir to Velazquez' genius was Goya (1746-1828), whose portraits and Spanish scenes put him into the foremost rank of creative genius. He never acquired the great master's faultless craftsmanship, but his search after truth and rare insight into character brought prodigious revelations to the nineteenth-century artists.

Dutch. The political partition of the Netherlands set the Dutch free from the yoke of Spain. The Protestant people of Holland did not require pictures of saints for their whitewashed churches, but the well-to-do citizens demanded portraits and small panels wherewith to decorate their houses.

Franz Hals (1581-1666), the great realist who painted the outer man so perfectly that the inner man might easily be reconstructed therefrom, produced a vast number of portraits, creating, by broad, decisive brushwork, a magic illusion that throbbed with life. At the age of seventy he produced the famous "Hille Bobbe," now in the Berlin Gallery. His wonderful portraits in the National Gallery, his "Laughing Cavalier" in the Wallace Collection, the rich harvest in the Dutch galleries and in Kassel, all show his power of communicating to us his clearly sensed impressions. Other famous works of Hals are the "Bohemian Girl" and "Descartes," in the Louvre.

Rembrandt (1606-1669), the greatest genius of the North, did not paint portraits which distinguished themselves through the realistic recreation of the outer, but the intimate reconstruction of the inner man. With this end in view, he sacrificed recognized canons of composition and technique, and was always in search of adequate methods of expressing man's soul in his face. He was a precocious genius, and realized, even as a young man, that art is an emotional expression of life. With keen sensitiveness, his pictorial vision conjured up the whole range of the ever varying emotions of man, be it the pathos of old age or the inquisitiveness of youth. The emotional possibilities of light were for ever haunting him. He went against the vogue of fashion, lost his sitters, but learnt to compel his hand more and more to tear the veil from the genteel life of his day and render the unvarnished truth. Pictures like his "Night Watch," "Portrait of a Rabbi," "Portrait of his Mother," "The Jewish Bride" and "Hendrikje Stoffels" are universally loved.

The Dutch were also the first real landscape painters in European art. Their fine sense of atmosphere, whether indoors or

outdoors, was ideally realized in Pieter de Hooch's (1629-1677) interiors, while Vermeer van Delft (1632-1675) painted atmospheric tone and the flux of Nature with rare delicacy of handling. Rolling skies and low-lying landscapes were the favourite themes of Albert Cuyp (1620-1691), the supreme master of pastoral scenes, and Hobbema (1638-1709) added the charm of the ever varying beauty of trees. The English landscape painters, foremost of all Crome,



"Susanne Fourment"
(National Gallery)

emulated him, and saw in his landscapes the rhythmic utterance of the moods of Nature.

English. The glorious manuscript of the Lindisfarne Gospel, c. A.D. 700, in the British Museum, shows us how skilfully and elegantly English-Celtic artists in the days of Saint Cuthbert wielded their brush in the so-called "Dark Ages." Coats of whitewash which the Puritans put over many frescoes are gradually disappearing, and reveal a high standard of artistic achievement. We owe it to Professor Tristram's unique skill and care that we are obtaining an insight into the glory that was once English pictorial art. The Chichester Roundel (1260), that most graceful and delicate presentation of the Virgin and Child; the paintings at



CONSTABLE
 "Salisbury Cathedral"
 (National Gallery)

Winchester Cathedral; Matthew Paris' work at St. Albans; the "Life and Death of the Virgin" in Croughton (Northants) village church; the frescoes of St. Anselm's Chapel in Canterbury, and those at Little Missenden, Eton College, Pickering (Yorks), and Horley (Oxon) are testimonies to the skill and artistic feeling of English artists of the Gothic period.

Although under French influence, the Wilton Diptych, which once belonged to Richard II, shows the characteristic refinement, elegance of style and tendency to elongation of the English school of the fourteenth century.

Lady Margaret Beaufort's sympathetic portrait in the National Portrait Gallery, London, reveals her pious and lovable character without detracting from the beauty of the restrained design. After Holbein's stay in England in the reign of Henry VIII, many English artists emulated him, and that delightful portrait of Lord de la Warr in the National Gallery shows the influence of the continental style on English painting. Queen Elizabeth's taste was notoriously bad, and she demanded portraits of herself in an archaic style of her court painters. But Hilliard's masterly portraits bear evidence of an elegant yet virile style. The Portrait of his Father in

the Salting Collection in the Victoria and Albert Museum is an excellent example of the continuation of the English tradition.

Again and again capable foreign painters, foremost among them Van Dyck, came to England, and they both stimulated and set back the English achievement. Leys and Kneller painted the Court beauties of the days of the Merry Monarch, often with too facile a brush.

English art did not come into its own again until the advent of Hogarth (1697-1764). An outstanding portrait painter, he yet achieved popular fame by his series of moralizing works like "Marrage a la Mode," "The Rake's Progress" and "The Election." Fortunately Hogarth's inborn faculty for design and colour harmony was so great that even his tendency to preach could not spoil his work.

The two greatest English portrait painters of the eighteenth century were contemporaries. Sir Joshua Reynolds (1723-1792) had a unique gift for handling each sitter differently. Whether he portrayed a dignified statesman or a charming lady, a rosy child or a happy young mother, with infinite skill he worked out each individual problem of character and psychology and endowed each composition with its own appropriate rhythm. For about forty years he acted as

pictorial chronicler of the "well-bred" people of his age. The National Gallery, the Wallace Collection and many private homes in England, possess specimens of his ever varying creations. "The Age of Innocence," "Miss Bowles," and "The Strawberry Girl" record the rosy freshness of childhood, while the "Two Gentlemen," the famous Lord Heathfield and Captain Orme, reveal Sir Joshua's fine understanding of the spirit of man. Often, in lovely quiet tones that range from cool silvery to warm brown tints, he enshrined the refined reticent beauty of English ladies, as in the "Countess of Albemarle," "Lady Bamfylde," "Lady Cockburn" and the remarkable "Nelly O'Brien." Sir Joshua became the first President of the Royal Academy.

Gainsborough (1727-1788) was much more moody and spontaneous, his vision was more poetic, and in rare moods his portraits became great works of art which affect one deeply through their note of poignant melancholy and poetical interpretation, as in the haunting portrait of Elizabeth Linley and her brother, now in the Pierpont Morgan Collection.

Society painters like Romney (1734-1802), Raeburn (1756-1823) and Lawrence (1769-1830) retained charm and personal vision, but all too often lacked ingenuity of design and sincerity. The Kenwood Collection has charming examples of their work in a delightful setting.

It is, however, as landscape painters that English artists had their finest visions. Wilson (1714-1782) painted landscapes in an age when this art meant starvation. George Morland (1763-1804), whose private life was dull and sordid, broke away from tradition in landscape painting, and paved the way for Turner (1775-1851), who, in his landscapes, became the poet of colour, the direct heir of Claude Lorrain's golden visions. For the sake of abstract colour symphonies, Turner neglected form, but he mastered the pictorial value of every aspect of light. Pictures like "The Fighting Temeraire," "The Burial of Wilson," and "Rain, Steam and Speed" leave a deep impression of the poetic rightness of his presentation on our mind.

Constable (1776-1837), the lover of the English country lane, painted the glittering dew on the grass, the characteristic shape of trees, with a brush laden with unbroken, bold colours. At first it was Flatford, with its leafy country lanes, that provided the stimulus, later on he was fascinated by the grey skies over the soft undulating breadth of Hampstead Heath.

William Blake (1757-1827) was the prophet painter, whose rare imaginative genius

created innumerable designs of the greatest poems that ever stirred the world. Some of his best water-colours of Biblical stories are of monumental grandeur.

The ideas of the Romantic School of the Continent, especially the "Nazarenes" in Germany, spread to England, and the Middle Ages, with their legends and pageantry, set the talents of the men of the Pre-Raphaelite Brotherhood aflame. Dante's stories and the tales of Morte d'Arthur became the subject-



SIR JOSHUA REYNOLDS
"Nelly O'Brien"
(H. Wallace Collection)

matter for Rossetti (1828-1882) and his circle. The gifted Madox Brown (1821-1893) painted with daring modernity, while Holman Hunt (1827-1910) went to Palestine in search of fresh emotional stimulus. William Morris (1834-1896), with all his wealth of culture, destined to be of great influence, put the clock back in his attempt to revive expensive old crafts, while his friend Burne-Jones (1833-1898) despised modern designs altogether. He sought to escape from the responsibilities of his own time by creating an aesthetic wonderland. Those artists who were less highbrow, like Frith (1819-1909), endeared themselves to ordinary people with their lively presentations of things from everyday life. Frith's "Derby Day" and "The Railway Station" created a wide sensation in their day.

French art remained for a long time under Flemish influence. In the days

of Francis I, Italy held sway over the pictorial fate of France. Fouquet (1415-1485) infused his exquisite miniatures with a lyrical note, while his portraits showed the sincere and sound handling of Flemish tradition.

At the beginning of the sixteenth century, the delicate masterpieces in portraiture by the Clouet family foreshadowed the indigenous elegance of the French style. Nicholas Poussin (1594-1665) created the historical and subject painting of France. His dignified spacing and original style can best be seen in his great "Bacchanale" at the Louvre.

Claude Lorrain (1600-1682), like Poussin, spent most of his life in Italy. Although he

show a great variety of handling and largeness of conception. As court painter to Marie Antoinette, Mme. Vigée Lebrun (1755-1842) was courted by the world of fashion before the days of the French Revolution, and painted its flippant womanhood in a charming if somewhat conventional style. Her portraits of herself and her little daughter will ever enchant us with their graciousness.

The artists of the Revolution followed the philosophy of the day; Greek beauty and severity was their ideal. Ordinary members of fashionable society played at being Greeks. David (1748-1825) and Ingres (1778-1867) painted in the so-called "neoclassic" style, which became the vogue of the time.

The romantic movement that swept over Europe at the beginning of the nineteenth century kindled in the genius of Delacroix (1798-1863) a passionate love of fashion's splendour with its romance, which he interpreted with a sincere and colourful palette.

The school of Barbizon, a little place near Fontainebleau, under its leader, Barbis Millet (1814-1875) and Theodore Rousseau (1812-1867) painted the charms of the country and its peace and folk, and brought to the fore art with all its mystery. The leader of the Barbizon painters was perhaps Jean Baptiste Corot (1797-1875) who painted in many parts, but chiefly in the neighbourhood of Fontainebleau. In his life, he spent most of his hazy landscapes were him with a touch of the sun. Some of the best are "The Pasture," "Morning," "The Road to Fontainebleau," "Souvenir of Italy." Corot's style was a detailed real, enjoyed its imitators, but recording the effects of light and mood. This achievement was to be recognized by the Impressionists, whose leader, Manet (1832-1883) objected to tedious atmospheric and artificial arrangements.

Manet's masterly simplification enabled him to make the most complex picture almost dignified and balanced. He coupled the gift for delicate colours with a skill and firmness of handling. He and his followers understood best how to fit the colour to the varying mood of light and atmosphere on the canvas. They destroyed outlines, the solidity of form and had no interest in the story of a picture. The almost splendour of delicacy of such works contained, as in the case of Hilare Degas (1834-1917), fleeting suggestions of movement in horses, ballet girls and bathing women; there was always a momentary poise, an interesting awkwardness, which he portrayed with subtle gradations of colour.

Claude Monet (1840-1926) advanced a step further. He built up shapes by using pure colours in broken strokes side by side,

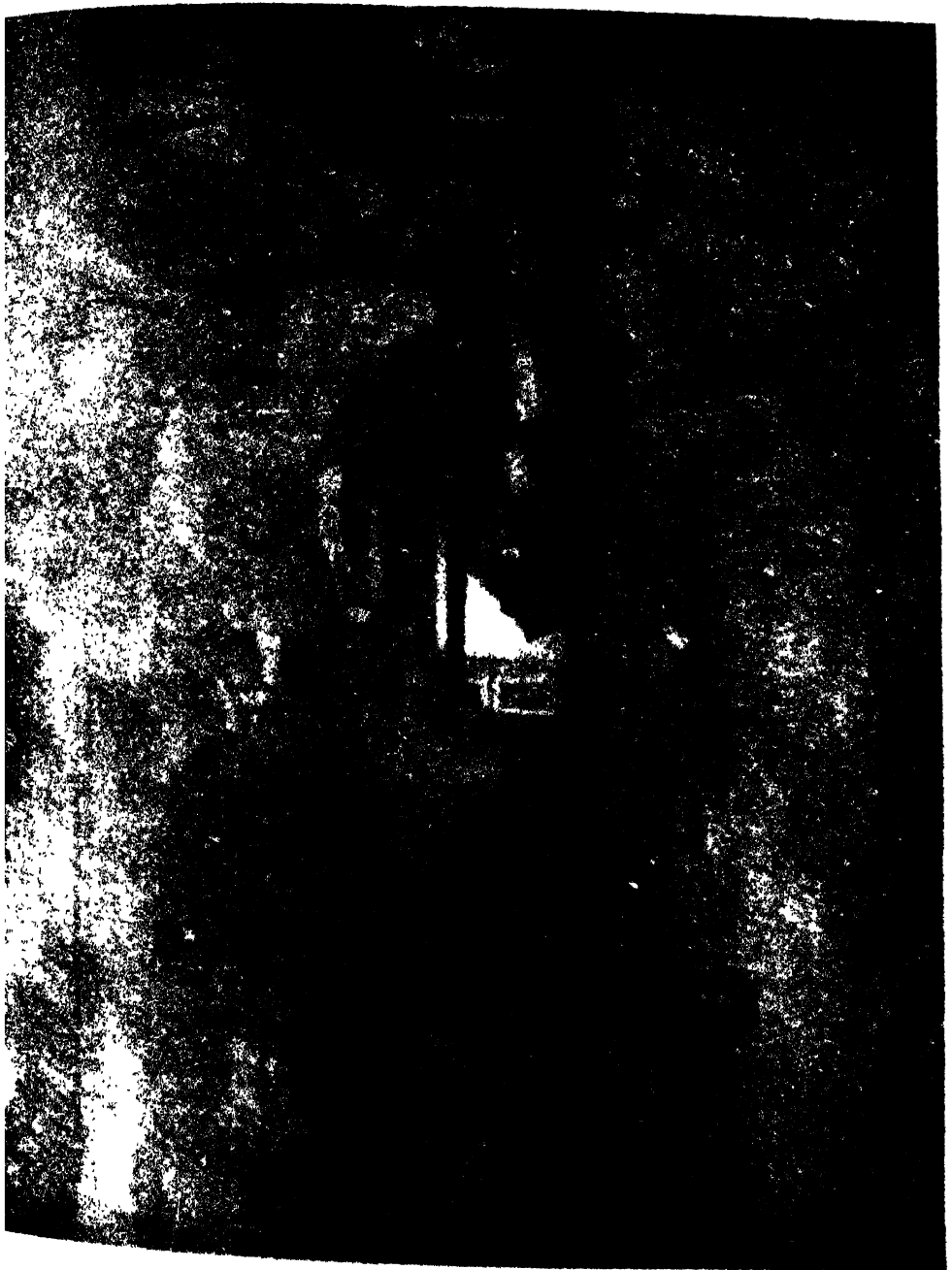


STANLEY SPENCER
Christ bearing the Cross
(Life Guards)

to whose enchanted of the blue skies and golden atmosphere of Italy, he uttered these visions in a truly French fashion, with majestic splendour of design and subtle feeling for colour. Claude Lorrain was one of the greatest landscape painters of all time. His "Enchanted Castle" in the Wallace Collection inspired the poem by Keats.

Watteau (1684-1721) completely broke the spell of the grand manner of Louis XIV's days. He ushered in the Rococo style with its wistful grace and yearning after Nature. With pensive melancholy Watteau depicted the life of the leisured class, with its courtly splendour, and his rendering of texture revealed his artistic sensitiveness.

Fragonard (1732-1806) lavished rare decorative qualities on the eccentric wishes of the notorious society of his day. Such works as "The Swing," "Chiffre d'Amour," and "The Fair-haired Boy" in the Wallace Collection,



and left the task of blending these to the focusing power of the eye. Thus he created an illusion of light upon an object that had never been achieved before with the same intensity. The distance or nearness of things was expressed through the values of colours.

Picasso, Sisley, Renoir, Seurat, Signac, belong to this so-called school of "Valeur" painters. Others came under the spell of the scientific discoveries of the wave theory of light, and tried to apply these laws by introducing little dots of colour on the canvas. This manneristic system was called "Pointillism."

Modern Art in Europe. Light, and what semblance of form remained, were always on the verge of rapid change. The eternal stability of form had been destroyed. A violent reaction against this disintegration of form set in, and Cézanne (1839-1906) was looked upon as the leader of the rebels, the father of Post-Impressionism. Deliberate establishment of form, simplification in drawing, and emphasis of the volume of the painted object, coupled with the most exquisite and craftsmanlike brushwork, form the fundamental principles of Vincent van Gogh's (1853-1890) work. Endowed with an almost unnatural love of brilliant sunshine, he succeeded in creating the artistic impression of the unusual appearance of familiar objects. His "Cypress Tree," with cornfield and stormy sky, is well known.

His friend Gauguin (1851-1903) fled from the stale civilization of Europe to Tahiti, where the primitive yet exotic atmosphere provided him with suitable subjects for his beautiful colour designs.

Simplified, non-realistic decoration was carried even a step further by Henri Matisse, while the Spaniard Picasso has experimented with the third dimension. This self-conscious emphasis of the three-dimensional aspect of form in art is called "Cubism," and Pablo Picasso is considered its father.

In Italy, the leaders of the Futurist and Verist movements, Carlo Carrà, Russolo and Boccioni, preached the destruction of all art of the past, the capturing of the innate spirit of the dynamic forces of Nature. Their pictures are no recommendation of their theories.

Expressionism found its natural philosophical background in Germany. For many German artists it meant realization of mysticism in paint—hence the many religious pictures. The art of this movement dwelt on the conscious twist of form and colour, the elimination of naturalistic appearances, with the intention of making these deviations from natural verisimilitude disengage certain moods and feelings. Nolde, Pechstein, Schmidt-Rottluff, Kokoschka,

Marc, Feininger and Gross have each in his or her way interpreted aspects of the psychology of our age. All of them defy Nature.

Russians like Chagall, Segall, Zrzavy, the Dadist Golyshev, Bechtejew and Mogilevsky were passionate, mystic, often sad and pathetic in the presentation of their extraordinary subjects.

Only a few highbrows in England paid attention to all the new "isms" in art. The American, Whistler, nonplussed the orthodoxy of the academic style in England. His "arrangements," to which he gave musical



VAN GOGH
"Sunflowers"
(Tate Gallery)

titles like "Nocturne in Blue and Gold" were much influenced by Japanese art. The studied refinement of his colour schemes required an over-tutored eye. It is no art for the man in the street.

The English tradition is capable of assimilating many new features in an unconscious, unobtrusive way; Sargent, Orpen, Lavery, Augustus John, Brangwyn, Sickert and Steer base their individual styles upon a close study of Nature. These artists have no prejudices against any modern school, their natural instinct tells them when to modify and eliminate the thousandfold variety of Nature, and when to follow her attentively, in order to catch her ever-changing, intimate moods.

Simplification and distortion have been employed by many modern artists. They

seem to fit the terrible war subjects of C. R. W. Nevinson, their fearfulness being emphasized by the exaggerated reality of all forms and the angularity of the design; while John Nash turns the unromantic

"Resurrection" in the Tate Gallery, Spencer attempted to reconstruct pictorially the narrative of the New Testament in the new psychological and visual orientation.

Meninsky enjoys painting the fullness and vitality of form; the decorative element of his design is not so prominent as not to leave room for emphasis of human emotion. Kramer's "Pogroms" and "Day of Atonement" in the Leeds City Art Gallery, his Portrait of Mrs. George Parker, and his etchings show a rare gift for balance and design. Rex Whistler's pleasant and humorous decorations, "The Pursuit of Rare Meats" in the restaurant of the Tate Gallery, entertain the eye.

Such artists as Sir Charles Holme, Walter Bayes, Harold Gilman, Charles Ginner and T. B. Manson couple beauty of design with a power of representing objects in a new, decorative garb.

Many English artists show stronger sympathies with naturalistic tendencies, others use some sort of striking non-realistic emphasis in order to translate to us the inner truth of their vision in pictorial terms. Lack of interest in modern art is laziness of mind. Many people are content to like what they are familiar with. Great art, whether modern or old, needs a reverent, patient approach, and years of loving study.

PAISLEY. A manufacturing town and port of Renfrewshire, seven miles west-southwest of Glasgow, served by the L.M.S.R. It has a population (1931) of 86,441.

As Passeleth it is known to have been in existence in 1157. In 1163 a monastery was founded there, and this brought life and prosperity to the village, which gradually grew both in population and importance until its elevation into a free burgh by a charter granted by King James IV in 1488. During the next thirty years Paisley as a medieval town reached the zenith of its glory, and was one of the four great centres of trade in Scotland. In 1666 a Charter of Charles II put Paisley on the same footing as Glasgow.

The shawl trade, with which the name of Paisley is connected, commenced about the beginning of the nineteenth century, but later, after a successful period, it declined.

About 1826 the cotton thread industry was introduced, and now the mills of J. & P. Coats, Ltd., give employment to many. There is also a large and varied number of other trades and industries, including engineering, shipbuilding, carpet weaving, leather, soap, tobacco, dyeing and bleaching works. There are in addition manufactories of starch, cornflour and preserves.

PAKENHAM, SIR EDWARD MICHAEL (1778-1815). A British general of some note. He was born in Ireland, entered the



MANET
Soldier examining the lock of his rifle.
(National Gallery)

shapes in the trenches and dugouts into striking patterns.

Henry Lamb is a powerful artist and psychologist, whose enforced contours and geometrical treatment emphasize shapes and solidity and lend dignity and perfect poise to his sitters. Stanley Spencer's work upset his contemporaries on account of the bewildering dualism which he practised. He painted unimportant trivialities or inanimate Nature with wonderful precision and beauty, but insulted men and women by distorting their limbs and facial expressions, so that often the whole work becomes irrelevant. He interpreted light, colour, Nature with a unique feeling for design, and realized extraordinary subtleties of the interchange of colour values. In his religious works, like "Christ Carrying the Cross" and the

Army, and became Major-General in 1812. While under Wellington in Spain, during the Peninsular War, he distinguished himself and did much to ensure the success of the British arms. Being sent to America in the War of 1812, he took part in the attack on New Orleans, and was killed on 8th January, 1815, two weeks after the treaty of peace was signed in Ghent.

PALAEOBOTANY, *pal e o bot' an i* Study of fossil plants. The earliest blue green algae occur in the Ordovician series of the Palaeozoic Age, and their descendants still exist. The first land-plants appeared probably at the end of the Silurian, and by the end of the Devonian, large trees and plants of modern organization and appearance were in existence. Other groups came into being, reached a climax and died out, not always completely—as in the case of the Equisetales, which were at a maximum during the Carboniferous and are still represented by the horse-tails. In the Carboniferous, too, the Pteridosperms and the Lycopods were at their maximum, these groups all combining to provide the raw material for the coal measures. The Coniferales and the Angiosperms, most important groups of the present era, became prominent in the Triassic and Upper Cretaceous respectively. So well can the distribution of groups, both in time and on the face of the earth, be worked out, that we may get a very fair idea of the flora, the appearance and the climate of any particular country at any particular date.

The plant remains are preserved either by incrustation, when we have, as it were, a fossilized imprint of the plant as it lay in mud or clay, or by petrification, which provides a complete fossil of the whole plant, its parts replaced by minerals, from which sections can be cut, and which can be studied like a living specimen.

PALAEOLITHIC, *pal e o lith' ik*, AGE. See STONE AGE.

PALAEOLOGY, *pal e on tol' o ji*. A special branch of geology devoted to the study of the fossil remains of plants and animals. It includes vertebrate palaeontology, invertebrate palaeontology, and palaeobotany.

The palaeontologist aims at giving a full and detailed description and diagrams or photographs of any fossil recognized by him. He takes care to compare his specimen with published accounts of similar varieties, and where possible with the type specimens themselves. For this reason, type specimens often are, and always should be, carefully preserved in museums, where they can be distinctively labelled and used for comparison.

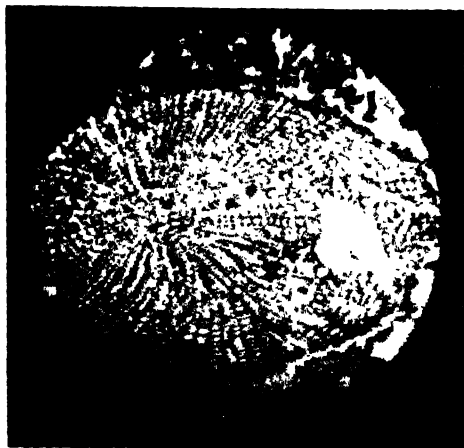
The chief difficulties encountered by the palaeontologist are—

1. That many of the fossils found are fragmentary, incomplete, or imperfectly preserved.

2. The fossils are often embedded in solid rock, and much time, labour and skill are required to extract them from the matrix.

3. The record of animals and plants which have lived throughout the world's history is necessarily very incomplete, because—

(a) The remains of land animals and plants are only occasionally preserved.



PORTION OF COAL BALL

A mass of limy material, containing fossil plants.

Photo: H. E. Taylor

(b) Fossils, which were once preserved in porous rocks, have often been destroyed by solution, and so only casts and impressions remain.

(c) Many animals and plants had no hard parts which could possibly be preserved.

In spite of these serious drawbacks, much work has been done and great results obtained. William Smith in 1791 was able to show that rock formations seen at Bath could be traced across England to the coast of Yorkshire by the fossils which they contained. Cuvier, by detailed work on teeth and bones, built up complete skeletons of extinct mammals and reptiles. Other workers, following the lines laid down by him, have been able to reconstruct the probable form of many reptiles, amphibians and mammals from their bones, which have been carefully and skilfully extracted from the rocks.

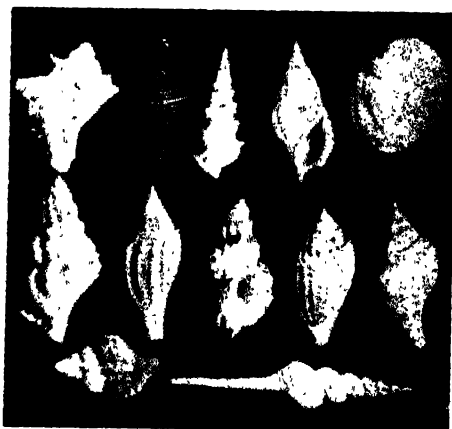
Murchison and Sedgwick did for the Silurian formation what Smith had done for the lias and oolite.

The work of these pioneers and their



FOSSIL PLANTS FROM COAL MEASURES

Photo: H. E. Taylor



FOSSIL GASTEROPODS FROM CENOZOIC ROCK

Photo: H. E. Taylor

successors has enabled geologists to fix the age of rocks with great precision, and to divide the great formations into smaller zones, which are recognized by the presence of some special fossil or suite of fossils.

Certain groups of fossils have been specially useful in this work, as the palaeontologist has been able to show, by pointing out minute differences of structure due to specialization or degeneration, that certain forms of echinoderms, ammonites, trilobites, graptolites, etc., have only lived during a very restricted period, and may therefore be used to indicate the time of formation of rocks.

By the comparison of fossils with similar creatures of the present day, and by careful study of their structure and anatomy, the palaeontologist is able to indicate something

of the conditions which prevailed when the rocks containing the fossils were laid down.

He may be able to indicate whether the climate was Arctic, temperate or tropical, and whether the rocks were laid down on land under desert or glacial conditions, or whether they were lacustrine, deltaic, estuarine, littoral or marine deposits. For instance, no echinoderm is found in rivers or lakes. Corals are all marine creatures. Some of the molluscs are wholly marine, but some of the lamellibranch division live in fresh water, and the gastropods may be either marine or estuarine, or even terrestrial in habit. Pelagic creatures have a wide distribution, and may often serve as zone fossils.

The distribution of fossil flora and fauna throughout the world has also received much attention, and the results of this study have given a new basis to the theory of the existence of various land bridges and lost continents, and provide a great body of evidence for the theory of evolution. See GEOLOGY; AMMONITES; FOSSIL; TRILOBITE.

PALAEOZOIC, *pal'eo-zo'ik*, AGE. The second of the great ages into which geological time has been divided, succeeding the Archean and succeeded by the Mesozoic Age. The name, which is from the Greek, means "pertaining to old life." The era is subdivided into the Cambrian, Ordovician, Silurian, Devonian, Carboniferous and Permian Periods, though some geologists recognize other periods. The aggregate thickness of the stratified rocks of Palaeozoic Age is very great, and the era must have been very long. Some groups of plants attained a high degree of development, but the flowering plants did not appear until later. See GEOLOGY.

PALAMEDES, *pal a me' dez*. See ULYSSES.

PALANQUIN, *pal an' kern'*. The name of a vehicle formerly much used in India, but more recently as a means of transport in China and Japan. The passenger sits within



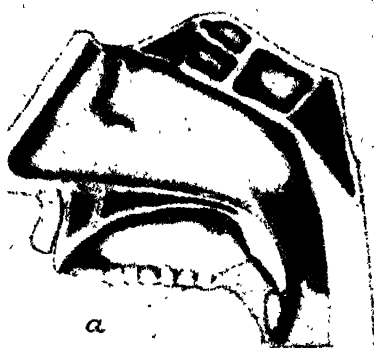
CHINESE BRIDAL PALANQUIN

Photo: Topical

a box-shaped compartment resembling a litter. It is suspended on poles, passing through rings near the top and projecting about 4 ft. from each end, and is carried by four men, who rest the poles on their shoulders, which are protected by pads. The carriers move forward at a slow trot.

Derivation. The word *palanquin* is derived from the Sanskrit *palyanka*, a bed.

PALATE. The roof of the mouth. The palate consists of two parts, the *hard palate*, at the front, and *soft palate*, at the back. The hard palate is formed by projections of the upper maxillary bones and the palate bones,



PALATE.
(a) Soft Palate

which are covered with a thick layer of periosteum. A ridge extends from front to back on the median line. The hard palate is covered with a mucous membrane which is lined with a thin membrane, called the *epithelium*. In these membranes are numerous minute sacs which form the palate glands.

The soft palate consists of a fold of muscular tissue covered with mucous membrane. It forms a partial partition between the mouth and the pharynx, and is raised in the act of swallowing so as to close the entrance to the back nasal passages. A conical projection, called the *uvula*, hangs from the middle of the soft palate, and on each side of the uvula are two curved folds of membrane, the arches of the soft palate. The soft palate contains numerous glands that secrete mucus, a fluid whose function is to lubricate the throat.

PALATINATE, *pa lai'* in ayt. The name of two German areas, distinguished as the Upper, or Bavarian, Palatinate, and the Lower, or Rhenish, Palatinate. The name belongs to the detached portion of Bavaria

west of the Rhine, while the Upper Palatinate forms another portion of Bavaria, with Regensburg as its chief town.

The former Upper Palatinate was bounded mainly by Bohemia and Bavaria, and its capital was Amberg. The Lower Palatinate, or the Electoral Palatinate proper, covered an area of 3150 square miles and lay on both sides of the Rhine; its capital was Heidelberg. The Counts Palatine who held the Palatinate and the districts belonging to it, as early as the eleventh century, were among the most powerful princes of Germany. By the Peace of Westphalia, in 1648, the Lower Palatinate was separated from the Upper. To Bavaria was given the latter, while the former became a separate electorate, and thenceforth was generally known as the Palatinate. By the treaties of Paris, 1814 and 1815, the Palatinate was split up, Bavaria receiving the largest part, the remainder being divided between Hesse-Darmstadt and Prussia.

PALATINE. A county palatine is a county which was formerly governed by a great baron having the powers of a viceroy; the word is derived from the Latin *palatium* (a palace). Certain outlying counties of England were administered in this way in the Middle Ages owing to their remoteness from the central government in London. They were Chester, Lancaster, Durham, Pembroke and Hexham, the last-named being part of Northumberland. The palatine counties had their own Courts and officers of State and were like independent kingdoms. The first Earl Palatine of Chester was Hugh the Wolf, nephew of William the Conqueror. The earldom was united to the Crown by Henry III, and henceforth became a title of the Prince of Wales, or of the Crown, as it now is; the palatinate was abolished in 1830. Durham was governed by its Bishop; the origin of the palatinate is unknown, but it was certainly in existence by the thirteenth century. In 1836 the palatine powers, though at that time never exercised, were vested in the Crown by Act of Parliament. The Durham Court of Pleas was abolished in 1873, but the Chancery Court still exists, though it rarely sits. Lancaster is thought by some historians to have been a county palatine from the Conqueror's time; according to others, it was not one until the reign of Edward III, by whom Henry, Earl of Lancaster, was created Duke with palatine powers as exercised in the county of Chester. The Duchy is now vested in the Crown. The Lancaster Court of Common Pleas and Court of Criminal Jurisdiction were abolished in 1873, but the Chancery Court is still in active existence. The palatinate of Pembroke was abolished in the time of Henry VIII, and

that of Hexham in the reign of Elizabeth. See LANCASTER, CHANCERY COURT OF.

PALATINE HILL. See ROME.

PALE, THE ENGLISH. From the time of Henry II, the kings of England, who styled themselves "Lords of Ireland," held only Dublin and other territories in the east of the island; this land was known as the English Pale. By the end of the Tudor period the whole island was conquered, and the Pale ceased to exist as a unit. Similarly, the coast round Calais was an English Pale from its conquest by Edward III to its loss in the reign of Mary Tudor.

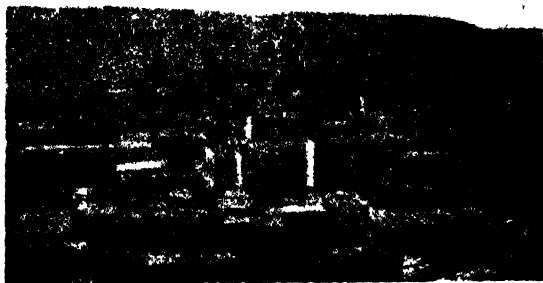
PALERMO, *pa ler' mo.* See SICILY.

PALESTINE. A country lying along the eastern shore of the Mediterranean Sea, south

schools for Christians are maintained by religious organizations; and the Zionist organization, with other Jewish bodies, conducts more than 250 schools for Jews, including secondary schools in Jerusalem, Tel-Aviv and Haifa, an agricultural school for women, an Arts and Crafts Institute, and a technical college. A Hebrew University at Jerusalem was opened in 1925.

A spirit of co-operation between the Arabs and Jews seems impossible, and clashes are continual. Each group has resented the presence of the other—the Arabs because they felt that the British promise to help build up a Jewish national state in Palestine ignored their own rights there; and the Jews no less strongly because they felt that the Arabs were receiving an undue proportion of help from the government, while world organizations of Jews assumed the burden of their own education and settlement.

Anti-Jewish rioting on the part of Arabs occurred at the "Wailing Wall" in 1929. In May, 1936, Arab defiance reached the proportions of a rebellion against the *Pax Britannica*. Strikes, sabotage and organized banditry continued for six months until, after the dispatch of 12,000 British troops, the Arab leaders ordered resistance to cease.



ACRE

Throughout history, this Palestinian city has been one of the gates by which invaders have entered the country.

Photo: OROC

of the new Syria, west of Trans-Jordan and north of Hejaz, and in the south reaching the Gulf of Akaba. The area of the country is about 10,000 square miles, and the population is 1,261,000 (1935).

Post-War Racial Problem. There are in Palestine 850,000 Moslems, 375,000 Jews and 100,000 Christians. The Arabs are formed into many tribes. Through the influential Zionist Movement (which see), Jews all over the world have been encouraged once more to look toward Palestine as their national home. There are now more than one hundred settlements of Jews in Judea, Samaria and Upper and Lower Galilee. The Arab population has also increased. Immigration is controlled by government policy, and admission is limited to the number which developing industrial and agricultural opportunities can absorb.

The mixed population necessitates three official languages, English, Arabic and Hebrew. The Government maintains about 300 schools, chiefly for the illiterate Moslem population, as well as a teachers' training college and a technical school. Nearly 200

CITIES AND TOWNS

Jerusalem is described in a separate article. Other ancient cities or ancient sites are—

Acre, or **Akka,** at the foot of Mount Carmel. In medieval times, it was a place of great importance, being the key to the Holy Land, and in consequence it is famous for many sieges and frequent destruction. In 1104 it was taken by the Crusaders (see CRUSADES). In 1187 the Saracens recaptured it, but it was recovered by Richard Coeur de Lion, who gave it to the Knights of St. John of Jerusalem. In 1291 it was again taken by the Saracens. Napoleon attempted unsuccessfully to take Acre in 1799. Little of interest now remains. Even the harbour, once a noted seaport of Syria, is declining in importance; the city's population is 7893 (1935).

Beersheba, a city of the Promised Land of the Hebrews, associated with the life of Abraham, Isaac, Esau and Joseph. It lies in the extreme south of Palestine. The ancient city is now but a heap of ruins. A new town of about 1600 inhabitants lies south-west of the old site.

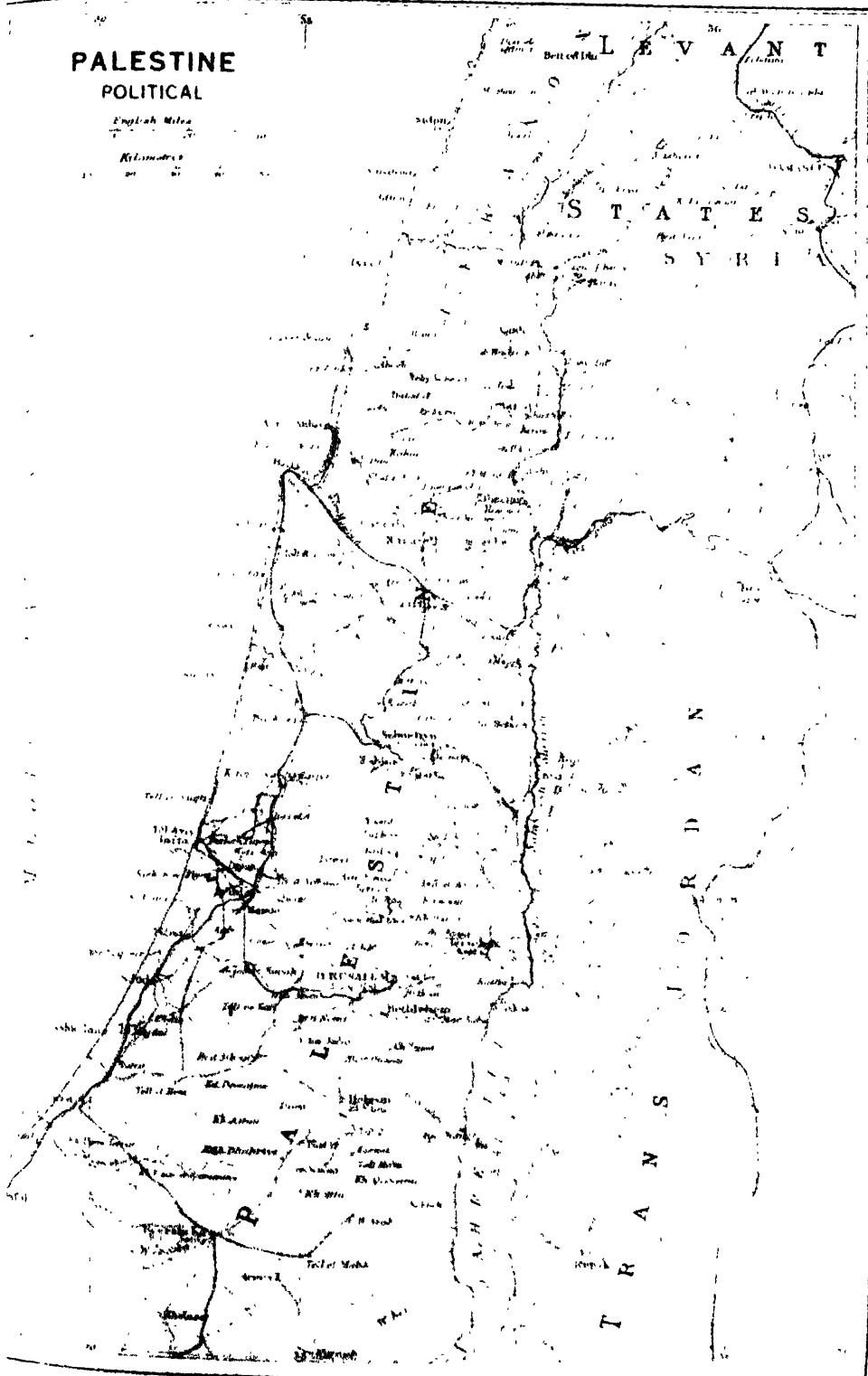
Bethel, the place where Abraham pitched his tent, where Jacob saw in his dream the ladder reaching to Heaven, upon which angels

PALESTINE POLITICAL

English Miles

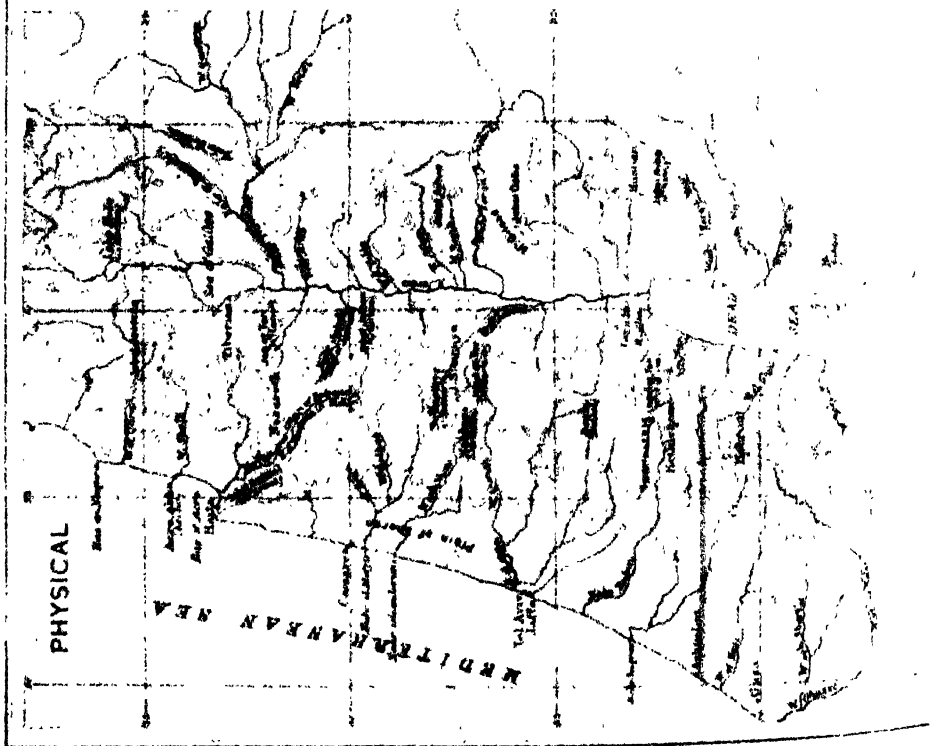
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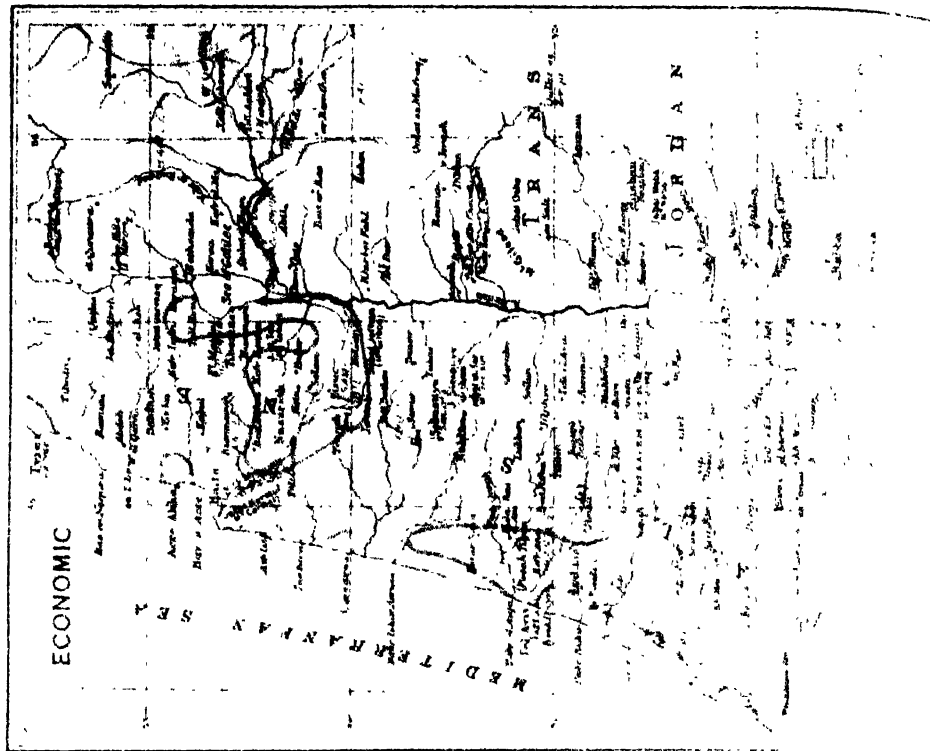


PALESTINE

PHYSICAL



ECONOMIC



were ascending and descending, and where he wrestled with the angel, and had his name changed to Israel. There are various opinions about the site of Bethel, but most authorities consider it to be about 12 miles north of Jerusalem. The name means "house of God."

Bethlehem, the town in which Jesus Christ was born. The name means "house of bread." Bethlehem is now the small village of BETH LAHM, population 6817 (1931), five miles from Jerusalem. The Basilica of the Nativity, originally built by the Emperor Constantine in A.D. 330, although it has undergone many changes and alterations, is the oldest Christian church still in use. It covers the supposed site of the stable in which Christ was born and laid in a manger.

Hebron, about 19 miles southwest of Jerusalem, existed as early as the days of Abraham. In the present town, which is called EL KHALIL, stands a great mosque named El-Haram. Within the walls of this mosque is a cave, supposed to be the ancient sepulchre in which not only Sarah, but also Abraham, Isaac, Jacob and Rebecca, were buried. It was in Hebron that David was crowned King of Israel, and he reigned there for seven years. The present town, which is

and accounts of recent excavations prove this supposition to be true. Although much of the city was destroyed by the Israelites, it was later rebuilt. The history of Jericho is that of repeated destruction and plun-



OUTSIDE THE WALLS OF BETHLEHEM
Photo OROC

derings. After it had been sacked by the Romans, Herod the Great rebuilt it, erecting a royal palace on the hill behind the city, but to-day all that remains is a small village named Er-Riha. Of ancient Jericho itself, only a pool and the fragment of a wall remain.

Nazareth, a town in ancient Galilee where Jesus spent his early youth. There is no mention of Nazareth in the Old Testament, which proves that the town was little known.

For some centuries after Christ, Nazareth continued to be obscure, but about A.D. 600, it became a place of pilgrimage. The present town, called En Nasira, has a population of 8719 (1935)—far in excess of that of Biblical times—and contains the Latin Church of the Annunciation on the supposed site of Mary's house, one of the most famous pilgrim shrines in Palestine.

Samaria, the capital of the northern kingdom of Israel during the reigns of the later kings. It was built by Omri in the ninth century B.C., and was captured by the Assyrians about 722 B.C., when the region was repopulated with immigrants from the East, who were thereafter known as Samaritans.

After a long and troubled history, the town was given by the Emperor Augustus to Herod the Great, who named it Sebaste, and rebuilt it on a magnificent scale. It survives at the present day in the small village of Sebastiyeh. The original Samaria is now but a mound of debris.



JAFFA
Photo: Keystone

3040 feet above sea level, has a population of 17,532 (1935), principally Mohammedans.

Jericho, an ancient city of Palestine whose strongly fortified walls, according to the Bible story, fell at the shout of the Israelites. The city was long reported to be very rich,



BETHLEHEM FROM THE JERUSALEM ROAD

Photo: OROC

Modern Towns include—

Gaza. A minor port, situated on the railway to Cairo. The ancient city probably

Haifa. The best natural harbour on the coast. It is on the Bay of Acre, at the foot of Mount Carmel, the site of the ancient Sidon, but the present city is modern. Its population is 80,000; its chief exports are grain and oil. The pipe line from Iraq runs here.

Jaffa, a growing seaport with rail connection with Jerusalem, which lies 35 miles to the east, the chief port of entrance for pilgrims to the Holy Land. Quantities of fruit, wool, wine, oils, soaps and sesame are exported; its oranges are well known. The population is 65,000.

Tel-Aviv, adjoining Jaffa, is a new city and is now larger than Jaffa (population, 135,000). It has a flourishing port.

Physical Features. A coastal plain built largely of drifted Nile mud, two miles wide in the north and 30 miles in the south, faces the Mediterranean with a smooth harbourless coast. This is a region of much fertility, bearing many Mediterranean crops. To the east the plain rises steeply, with access by rugged gaps to the dry limestone plateau of Judea at an elevation of 2000 ft. to 3000 ft., which is essentially pastoral land, having few areas of fertility. In the north the plateau falls to the rich valley of Esdraelon, with its volcanic soils and prosperous agriculture. This is the southern part of Galilee. Eastward the Judean plateau falls by an abrupt escarpment to the rift valley of the Jordan and Dead Sea, which is known as El Ghor. This is a region of fertile soil and hot, damp climate, supporting a relatively small population. Access is difficult, except where Jericho commands the chief route. Rivers are of little importance. The only large one is the Jordan, which, however, is too swift for navigation, and in too deep a bed for

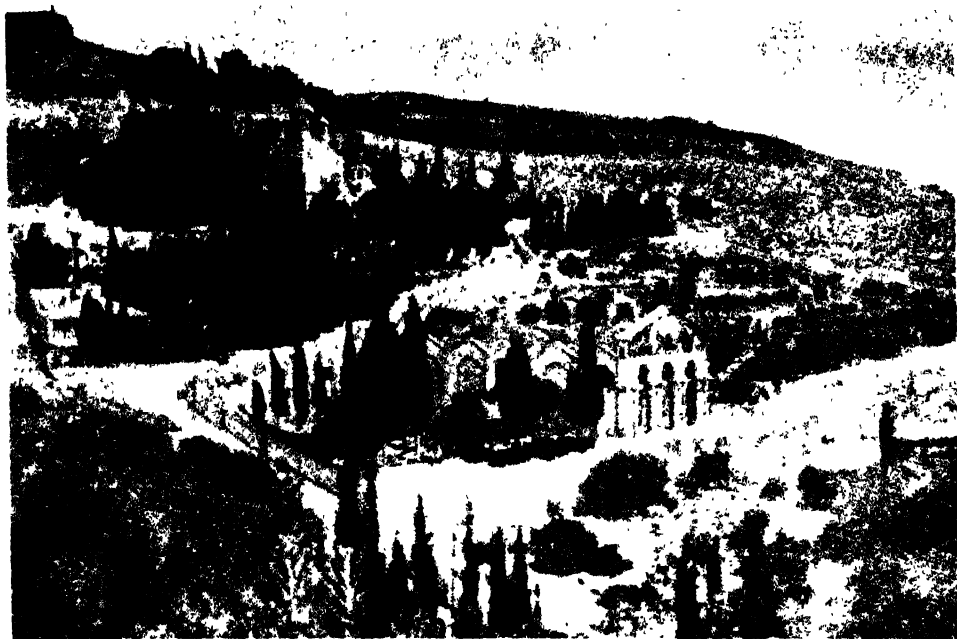


VIA DOLOROSA

On the left is the House of Veronica and farther up, in shadow, the House of Judgment

Photo: Central

stood three miles away on the coast. Barley is cultivated with success. Population, 17,069.



THE PALESTINE OF CHRIST
 Garden of Gethsemane (*left centre*); Mount of Olives (*top left*); Church of the Paternoster (*centre*),
 Valley of Kedron (*foreground*)
Photo Central



BEDOUIN VILLAGE AT THE FOOT OF MOUNT HERMON
Photo P. & A.

irrigation purposes. The Dead Sea, which is 1292 ft. below the level of the Mediterranean, has a salinity of 25 per cent, compared with the normal ocean salinity of 4 to 6 per cent. This is due to lack of outlet and loss of water only by evaporation. The Sea of Galilee, 682 ft. below sea level, is fresh and is noted for its fish. The climate of Palestine is typically Mediterranean on the coastal plain, with winter rains and hot dry summers. On the plateau there is rarely rain between May and August, but temperatures are lower.

Valley, around the Sea of Galilee. Further utilization of this power will increase the industrial enterprises, which now consist of flour mills, soap, brick and tile factories, oil mills and wine presses. The country exports soap, oranges, water-melons, raw wool, wine, almonds, hides and skins. Its chief imports include cotton fabrics, flour, cement, sugar, timber, motor-cars and machinery, and cigarettes.

Palestine has about 300 miles of railway, all owned by the Government, with connec-



The name, which means "Place of a Skull," is thought by some to refer to the skull-like weathering of the cliff-wall.

Photo: Central

Resources and Development. Palestine is an agricultural country. Irrigation is a great aid to increased production; mosquito-infested swamps are being drained, and the water of the springs is being conserved for the crops. In many cases, the drainage reveals submerged aqueducts and reservoirs of the Roman time, neglected during the centuries of the Moslem regime.

Wheat, barley, durra, olives, figs, grapes, oranges and tobacco are grown. The Government is encouraging re-afforestation, and has planted about 5,000,000 trees.

Minerals found in commercial quantities are limestone, sandstone, gypsum, rock salt and sulphur. Enormous quantities of chemical salts are available in the waters of the Dead Sea. Mineral-oil deposits have not yet been developed. Hydro-electric development has been begun by Jews in the Jordan

tions to Syria and Egypt. Public highways are about 600 miles in length, and nearly 400 miles are hard-surfaced. All of this development, however, exists side by side with methods as old as the ancient country itself—in agriculture, industry and transport.

Government. Palestine is administered by Great Britain under a mandate given by the League of Nations in 1922; it is under "Class A" of mandated territories. A constitution adopted in 1922 provides for a High Commissioner representing Great Britain, a Commander-in-Chief, and a representative Legislative Council, consisting of twenty-two members. Every male citizen over 25 years of age may vote. There is a Supreme Moslem Council to control matters connected with the Moslem religion. A Jewish Agency represents the Jewish population in dealing with the Government.



A SAMARITAN HIGH PRIEST WITH AN OLD PENTATEUCH ROLL AT NABLUS (SHECHEM), PALESTINE

Photo: U & L

History. In Old Testament times, the country was known as *Canaan* and *Philistia*, "Palestine" being the Philistine name of the southern part of Canaan. For long ages, Palestine was the home of the Jews, but it came under the control of Rome at the time of Christ. In the seventh century, it passed under the Moslem power, and from 1516 to 1919 was in the hands of the Turks and part of their former Empire. Great was the satisfaction of all Christendom when, during the World War, British and Arab forces drove the Turk from Jerusalem and out of Palestine. Now, under an orderly, progressive Government, the country hopes to develop national entity and independence, based on the preservation of mutual tolerance among the varying races. See *Jews*; *World War*; etc.

PALESTRINA, *pal es tre' na*, GIOVANNI PIERLUIGI DA (1526-1594). An early Italian

composer, generally called Palestrina from the town of his birth. Between 1544 and 1551, he acted as Chapel Master in the cathedral of his native town. In 1551, on the accession of Pope Julius III, previously Bishop at Palestrina, the young musician was appointed Music Director of the Giulia Chapel of St. Peter's in the Vatican. Three years later, Palestrina dedicated his "First Book of Masses" to the Pope.

Later the composer became Chapel Master in the Church of St. John Lateran at Rome, remaining there for over five years. Then, for ten years, he held a similar position at Santa Maria Maggiore (1561-71). In 1564 the reigning Pope, Pius IV, appointed a commission of eight cardinals to consider the improvement of Church music. Invited to submit music that would be free of current abuses, Palestrina tendered three Masses, of which the "Mass of Pope Marcellus II" was

accepted as a model of purity of style. His Masses are still frequently rendered in Roman Catholic liturgy.

PALEY, WILLIAM (1743-1805). An English philosopher notable for his work in ethics and natural theology. Paley was educated at Giggleswick School and Christ's College, Cambridge. He entered the ministry of the Church of England, but lectured in philosophy for some years before entering upon parochial work. Among the most notable of his publications are *The Principles of Moral and Political Philosophy* which achieved a remarkable popularity, and *Natural Theology, or Evidences*



ARCHDEACON PALEY
(National Portrait Gallery)

of the Existence and Attributes of the Deity, collected from the Appearances of Nature. In this latter book he elaborated the traditional proof of the existence of God from the fact that there is evidence in the Design of Nature of a guiding will. Paley received high preferment in the Church, becoming a Canon of St. Paul's and the sub-dean of Lincoln.

PALGRAVE, FRANCIS TURNER (1824-1897). An English civil servant who produced several volumes of poetry and became, late in life, professor of Poetry at Oxford, but who is chiefly remembered by his *Golden Treasury of English Songs and Lyrics*. The fruit of wide knowledge and discriminating judgment, this anthology still holds its place as perhaps the best book of its kind.



FRANCIS PALGRAVE
(National Portrait Gallery)

PALI, pah' li. The sacred language of the Buddhists. It has affinities with the Sanskrit, but its

actual derivation is unknown. It has ceased to be a living language, not only in India but in the Far Eastern countries to which

Buddhism was carried after its suppression in its original home. See **BUDDHISM**.

PALIMPSEST, pal' imp sesh. See **MANUSCRIPTS**.

PALINDROME. A word, sentence or verse, that spells or reads the same from right to left as it does when read from left to right, such as the imaginary saying of Napoleon, "Able was, I ere I saw Elba." Other examples are "lewd did I live & evil I did dwell" (John Taylor), and "Madam I'm Adam."

PALISADE. A barrier of sharp-pointed metal or wooden posts fixed into the earth to form a fence. The word is derived from *palus*, the Latin for "stake."

Palisades were used in very early times for defence, usually in combination with an earthen bank; the Roman soldier carried a stake, called *vallum*, to protect his camp. Ancient Britons fortified their villages with a palisade on top of a bank.

The famous "Maiden Castle" in Dorsetshire was a fortified village surrounded by three tiers of banks and ditches. Each bank was undoubtedly crowned by a palisade, from behind the cover of which the defenders poured missiles and boiling oil upon their assailants.

Metal palisades are still used to close the rear of an open fortification or to form an obstacle, under the close fire of the defender, in the ditch of a fort.

The chief difficulty in attacking a village surrounded by a palisade lies in the cover afforded to the defenders, who—in comparative safety—can shoot down the attackers as they try to breach the palisade. Heavy and accurate covering fire is necessary to prevent prohibitive casualties among the attacking force.

PALISSY, pal' li' se, BERNARD (1500-1589). A French potter and one of the most versatile men of his day. His fame now rests chiefly on his enamelled pottery, but he was also a scientist and philosopher, a pioneer in the field of geological and chemical research, a theorist on agricultural improvements, and the author of several books on art subjects.

As a youth he was apprenticed to a stained-glass painter, and also was trained in land-surveying.

He worked as a glass painter until 1542, when, seeing a curious cup of foreign origin and made of an unknown substance, he determined to discover the secret of its manufacture. For almost sixteen years, Palissy worked on experiments until he exhausted his resources. Although he was destined never to discover the secret of the pottery for which he had sacrificed so much, he had become by his experiments so expert in the potter's art that he was able to produce vessels of great originality of design.

brilliance of colour, and perfection of workmanship. Adequate reward for his years of struggle came in 1557, when his work was purchased by the queen mother, Catharine de' Medici, and by the nobles of the Court.

For years Palissy had been an avowed Huguenot and an outspoken critic of the Catholic Church. In 1561 he was arrested and imprisoned at Bordeaux, but at the intercession of his noble patrons he was released and given an appointment as potter to the queen. He was permitted to erect his oven and workshop in the royal garden of the Tuileries, where he enjoyed the patronage of King Henry III.

In 1579 he was again arrested at the instance of the religious authorities and taken into the Bastille, where he died.

PALLADIUM. A statue of Pallas Athene, made of olive wood, said in the Greek myths to have fallen from heaven and to have assured safety to the city of Troy as long as it was preserved there. During the Trojan War, Odysseus and Diomedes undertook to carry away the image. They went secretly at night, and Odysseus, who lifted up his companion so that he could climb over the walls, was unable to get in himself, as Diomedes refused to assist him. When they were returning, Diomedes carrying the image, Odysseus tried to slay his companion and take the palladium. A glint of moonlight on his sword betrayed his purpose, and Diomedes compelled the disappointed Odysseus to march in front all the way back, beating him with the flat of his sword.

PALLADIUM. A silver-white metal belonging to the same group of elements as platinum. It was discovered in 1803 by William Wollaston, an English chemist, and was named after the asteroid Pallas, identified the preceding year. The element occurs chiefly in platinum ores, but is also found in combination with gold and silver. It can be drawn into a wire or hammered into sheets, being both ductile and malleable; melts at a temperature of about 2815°F , and has a specific gravity of 11.8. Its symbol is *Pd*. Palladium bears a general resemblance to platinum, but is harder and lighter. Because of its capacity for absorbing hydrogen, it is used in chemical analysis.

PALLAS ATHENE, a the' ne. The Greek goddess of wisdom, literature and fine art, daughter of Zeus and Metis (she is said to have been born from the head of Zeus, who had swallowed her mother, fearing his offspring would be wiser than he). Pallas was adopted as the especial protectress of Athens; the magnificent temple, the Parthenon, was dedicated to her, and a colossal statue of the goddess, executed by Phidias, stood within it. Pallas was also viewed as the

goddess of victory, as well as of agriculture and of household crafts. The attributes of Pallas were transferred by the Romans to their goddess Minerva. See MINERVA.

PALLIUM. In the Roman Church, a vestment always worn by the Pope, and on solemn occasions by bishops having metropolitan jurisdiction. The bishops receive the pallium from the Pope as a mark of their power. It is a white narrow band, shaped like a double Y, suspended on the shoulders and hanging before and behind, and is decorated with purple crosses. It was concerning the ceremony of investiture with the pallium, that the Church and State disputes arose during the early Middle Ages.

PALM. A family of trees of great economic importance. The palmyra palm of India and Ceylon is estimated to have 800 different uses.

Geologists have found palm fossils which prove that the family was once a great deal



DATE PALMS
Photo. OROC



DATE PALM PLANTATION IN ARABIA



TRAVELLER'S PALM

So named because it stores at its base water, which can be tapped by the thirsty traveller.

Photo: Norddeutscher Lloyd

larger than it is to day. In the past the earth, palm grew luxuriantly in the north, as Greenland; now they are chiefly to tropical regions, although some varieties grow in more northern climes. Though on the decline, the family still numbers about 1100 different species. Palm is divided into two great classes: one, the *fan palm*, with leaves like huge fans, which are split into slender strips often 40 ft. long; the other, the *feather palm*, with leaves resembling uncurled ostrich plumes, sometimes as long as 20 ft. Among the fan palms, the most familiar are the *palmyra palm* of India and Ceylon, and the *Washington palm* of the California deserts. The *coconut palm* and *date palm* are the commonest types of the feathery-leaved class.

Habits of Growth. Most members of the palm family are giants, some of them reaching heights of 80 to 100 ft., with straight, branchless trunks surmounted by tufts or rosettes of waving leaves, and sheathed in shaggy masses, composed of the head leaves of other years. The *doom palm* of Arabia is almost the only palm with a branched stem. There are dwarf palms; palms that creep like vines; and still others, like the climbing *rattans*, that have stems hundreds of feet long and leaves with hooked ends, by means of which they spread from tree to tree.

The small greenish or yellowish blossoms that hang in clusters on the palm tree are enclosed in sheaths. In many species the

male and female—or staminate and pistillate—flowers grow on different trees, and natives fertilize the blossoms of one tree by placing among them the blossoms of another.

Palm Tree Products. From the date and palmyra palms especially come good timber for furniture, fences, ships, spars, and wharves. The *palmello* is particularly useful for wharf piles, since its corky wood is not easily rotted by water or destroyed by barnacles. The stems of the rattan furnish flexible material for wicker-work.

The pithy trunk of the *sago palm* and the cabbage *palmello* yield the starchy meal called sago. The sap of different species gives sugar, honey, wine, vinegar and *arrack*.

The great leaves of the palmyra and most other palms are used for thatching native dwellings, and for walls, screens, and bedding. Matting, shields, hats, clothing, fans, jackets, and rope and twine are all made from the fibrous leaf-stalks. The fibre of the *lutesaba palm* is found in many of the reeds and brushes in common use.

The date and the coconut palms have edible fruits. From the fruit or seed of the coconut, the *bacaba*, the *oil palm*, and scores of other is secured an oil that is put to many uses—as an ingredient of margarine, a lubricant, an illuminant, and a base for soap and candle grease. In Africa the seed of the date palm is roasted and used as coffee. The nut of the *ivory palm* yields a sort of ivory which is employed as a substitute for elephant ivory.

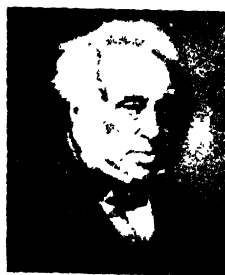
Scientific Names. The family *Phoenicaceae* includes the *Borassus flabelliformis*, Washington palm; *Neuwahia flamentosa*, coconut palm; *Phoenix*; date palm; *Phoenix dactylifera*, sago palm; *Metrosylon lacu*. The rattans form the genus *Calamus*.

PALMERSTON, HENRY JOHN TEMPLE, LORD VISCOUNT (1784-1865). An English statesman. He was born in Hampshire, educated at the University of Edinburgh, and entered Parliament as a Tory in 1807. Two years later he became Secretary of War, holding this office until 1828, through six administrations. In 1830 he accepted the post of Secretary of State for Foreign Affairs in Earl Grey's Cabinet, and filled the office, except for a brief interval, for eleven years. During this period he created Belgium (1830) and established its neutrality, supported constitutional government in Spain and Portugal against absolutism, and resisted the policy of Russia in the Black Sea and her encroachments upon Turkey.

From 1841 to 1846, Palmerston was out of office, but with the return of the Whigs to power, he again became Foreign Secretary under Lord John Russell. He gave open encouragement to Italy's aspirations for

unity and independence, and powerfully asserted the rights of British subjects abroad in the *Civis Romanus* speech (1850) relative to the claim of Don Pacifico, a British subject from Gibraltar, for compensation from the Greek Government. His openly expressed approval of Louis Napoleon's act in declaring himself Emperor of France (as Napoleon III) led to his dismissal from the Cabinet in 1851, but in the new Ministry formed the next year he became Home Secretary. Three years later, when the Earl of Aberdeen's administration proved unable to cope with the Crimean War, Palmerston was made Premier and brought the war to a successful conclusion. A vote of censure for his action in regard to the Opium War with China led to his resignation in 1857, but the country supported him and returned him to power with an increased majority. Within a few weeks, Palmerston was faced with the Indian Mutiny. He did not at first realize how serious the situation was, but later he acted vigorously in sending relief to the besieged garrisons and in restoring order. He was again defeated in 1858 on a vote disapproving his relations with Napoleon III, but in the next year became Prime Minister for the third time, and continued in the office until his death. Palmerston maintained a strict neutrality in the struggle between Italy and Austria and between the Northern and Southern States of U.S.A., then engaged in Civil War. He was unsuccessful in preventing the absorption of Schleswig-Holstein into Germany.

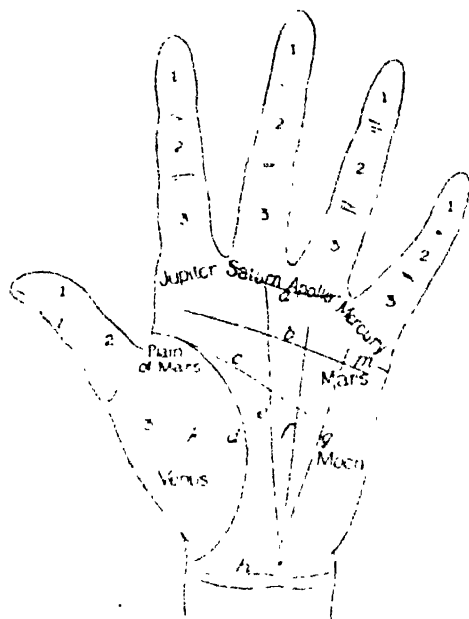
Intensely interested in making England respected abroad, Palmerston won the admiration of continental statesmen; but he strongly opposed the extension of the franchise, and he lacked the insight that was necessary to bring about much-needed reforms in England's domestic affairs. Paradoxically, he resisted the democratic movement at home while favouring Liberalism in other countries. Arbitrary by disposition, he was fond of acting on his own initiative, and frequently incurred the displeasure of Queen Victoria because he failed to advise her of the line he intended to take in important affairs of policy. His foresight and vigorous character made him extremely popular in England.



LORD PALMERSTON
Photo. Brown Bros.

PALMISTRY. The practice of divining or reading character and personal fortune from lines and creases in the palm. Along with other pseudo-sciences, palmistry has fallen into disfavour with scientific-minded people of to-day. The principles on which it is based may be briefly stated as follows—

In palmistry the *mounts* of the hand and the *lines* in the palm are made to tell the story of individual destiny. The mounts are the elevations at the base of the fingers and



THE HAND IN PALMISTRY

- | | |
|---------------------|----------------------|
| (a) Rug of Venus | (g) Line of health |
| (b) Line of heart | (h) Bracelets |
| (c) Line of head | (i) Will |
| (d) Line of life | (j) Reason |
| (e) Line of fate | (k) Love |
| (f) Line of fortune | (m) Line of marriage |

The numbers 1, 2, 3 refer to the "lesser" mounts of the joints in fingers and thumbs

thumb, and in the palm from the little finger to the wrist. They are named after the planets, and are seven in number (see diagram). When well developed, the mounts indicate the possession of the quality associated with the respective planets. For example, a strong mount of Jupiter denotes pride and ambition; of Apollo, art or riches; of Saturn, prudence; of Mercury, science and wit; of Venus, love and music; and of Mars, cruelty or courage.

The line of life surrounds the thumb; if long, it indicates long life, but if not continuous, that is, if broken, it gives a presumption that the possessor will not live to old age. The line of heart, if long, distinct,

and well coloured, indicates an affectionate disposition, the nearer the line stretches toward Jupiter, the more favourable the opinion as to devotion of character and warmth of affection. A strongly marked line of head is alleged to indicate superior intellectual qualities, in addition to imagination, provided the line stretches to the mount of the moon. If the line of head is wavering, it is supposed to show indecision of character and a tendency to frivolity.

PALMITIN. See LARD.

PALM OIL. A thick, yellowish oil obtained from the fruit pulp of the oil palm (*Elaeis guineensis*) of West Africa. It is of butter-like consistency when cool, is dark orange in colour, and has a pleasant odour. It is largely imported for the manufacture of soap and candles and lubricants, and for use in toilet preparations.

The fruit of the oil palm is approximately the size of a date, and consists of a deep fleshy portion, which encloses a stony kernel. A mature tree bears about ten clusters, and some 200 nuts. When the fleshy portion is boiled, it yields the palm oil. The kernels are generally shipped to Europe or America, and there crushed in hydraulic presses. The white fat extracted from the kernels is extensively employed in the manufacture of margarine. After the oil has been extracted, the crushed kernels are used as cattle feed.

PALM SUNDAY. The last Sunday before the Sunday preceding Easter, and the day of Holy Week. It was first celebrated in the fourth century by the Catholic Church in Jerusalem, in commemoration of the triumphal entry of Jesus, when He rode into the city seated on an ass. The observance of Palm Sunday in the Roman Catholic and the Eastern Orthodox Churches took the form of a solemn procession. In the Middle Ages, the Church added the ceremony of the consecration of the palms by the priests. These palms were taken home by the people as tokens of remembrance. This custom is still followed in the Roman Catholic Church.

PALMYRA, pal mi ra. See SYRIA.

PALMYRA PALM. A species of palm found throughout India and nearby islands and in other tropical regions. See PALM.

PALPITATION OF THE HEART. A rapid beating of the heart, of which the sufferer is very conscious, producing, in varying degrees, the sensations of suffocation, shortness of breath, or other distressing feelings. It may be a symptom of organic heart disease, or of goitre, and is often brought on by anaemia (which see). A very common cause is flatulence, a result of indigestion; the upward pressure of the gases on the diaphragm causes irregularity in the heart's



PAN TEACHING THE BLIND DAPHTIS TO PLAY
THE PIPES

Photo: Mansell

ation Shock, excitement, and excessive use of stimulants may bring on attacks. Sedative medicines are beneficial.

PAMIR. *pam cer'*. One of the highest plateaux in the world, situated in Central Asia, in the south-east corner of Turkistan, in the region where the Himalaya, Hindu Kush, Kuenlun, and Tien-shan mountain systems converge. The greater part of the plateau is barren and mountainous, but in the valleys along the few lakes and the River Oxus, which has its source here, the native Kirghiz find pasture for their cattle during the summer. Snow covers the land and blocks the passes for more than half the year, and high winds prevail most of the summer. Two important trade routes across the Pamir have been used since time immemorial, and, according to tradition this region is the original home of the Aryan or white race. The mean elevation is about 14,000 ft. above sea level.

PAMPAS. The Spanish term for "plains," used to designate several great plains of South America, but most commonly applied to the immense grass-covered area in the central part of Argentina, between the Rio Salado on the north and the Rio Negro on the south, which merges into the steppes of Patagonia. During the wet season, a lux-

uriant growth of vegetation provides pasture for cattle and sheep, but an increasing proportion of the region is being cultivated. It is one of the most fertile plains in the world.

PAMPAS GRASS. Name given to a species of American grass (*Gynerium*), nearly hardy in England and grown for the decorative effect of the silvery plumes thrown up in autumn on six-foot stalks. Propagation is by seed or division.

PAN. A Greek god. According to classical mythology, he was a woodland deity, the god of hunters, fishermen and shepherds. He was the son of Hermes, and at his birth was so frightful-looking that his nurse fled in terror. This ability to inspire unreasoning fear continued to be one of his chief attributes, and the word *panic* is derived from his name.

Pan is usually represented as half animal and half man, with goat's feet, curly hair, horns and a beard.

The worship of Pan was at first restricted to his own country, Arcadia, but later it spread to Athens and other centres. He was usually represented in art as attended by fauns and satyrs, and the Roman name for him was *Faunus*.

PANAMA. Occupying most of the narrow Isthmus of Panama, which joins the two Americas, this country has an area, excluding the Canal Zone, of 32,380 sq. miles. The



VILLAGE IN PANAMA

The children are pounding rice to remove the husk.

Photo: U. & L.



COUNTRY COTTAGE IN PANAMA

Photo: Keystone

latter section is a strip of land, five miles wide, on each side of the Panama Canal, which was granted to the United States. See PANAMA CANAL ZONE.

The total population numbers 467,450 (1930), and consists of Spanish whites, native Indians, and of *mestizos*. There are also many Europeans and people from the United States. The language is Spanish, and the religion of the country is Roman Catholic.

Cities. The two chief cities, neither of which are included in the government of the Canal Zone are—

PANAMÁ, the first city founded by Europeans on the American continent, is now the capital and largest city of the republic, and its chief port. Founded in 1519, in 1671 it was burned and its treasures carried away by the notorious buccaneer, Henry Morgan. Two years after this disaster, the city was rebuilt on its present site. Until the end of the eighteenth century, it remained the chief Pacific port for all Spanish trade. In 1855 a railway was opened from Panamá to the island of Manzanillo on the Atlantic.

The harbour is shallow, but the canal docks at Balboa, three miles away, furnish excellent facilities for shipping. All of the important buildings, except the cathedral and the President's Palace, are modern.

Sanitary arrangements are under the control of the United States, but, with this exception the affairs of the capital are administered by the republic of Panama. Population, 74,409.

Colón, northern terminus of the Panama Canal, founded in 1850, was formerly called Aspinwall. In matters of health and sanitation, Colón is under the jurisdiction of the United States, but for all other purposes it is a part of the republic. Colón has extensive harbour accommodation. Its population has grown from about 3000 negroes and Spanish-speaking natives of mixed blood (in 1850) to 29,769 in 1930.

Physical Features and Resources. The greater part of the country is occupied by forest-covered hills and low mountains, separated by deeply cut valleys. In the west there are several lofty extinct volcanoes, some over 11,000 ft. in altitude.

Panama has a tropical climate, with a mean annual temperature of about 70° F. The rainy season lasts from April to December, but even during the dry season showers are frequent.

Though the soil is rich and the rainfall is abundant, only a small portion of the isthmus is under cultivation. Nearly half of the country is not even inhabited. Bananas are grown, and their harvesting and shipment form the principal industry. Coconuts, cotton,



ANT'S NEST IN A TREE IN PANAMA

Photo: Visual Education Service

tobacco, and sugar cane are also cultivated. Gold and iron are present, but the mines are only now beginning to be developed.

Government and History. Panama is governed under a Constitution adopted in 1904, and modelled on that of the United States. The President is chosen by popular vote for four years. The legislative power is vested

April, 1917, and in 1920 became a member of the League of Nations.

PANAMA CANAL AND CANAL ZONE.

The latter is a district five miles wide on each side of the Canal, granted in perpetuity to the United States in 1903. The cities of Panamá and Colón are excluded, except as regards sanitation. The area is 553 sq.



CITY AND BAY OF PANAMA

Photo - Keystone

in the National Assembly. A Cabinet of five members assists the President.

For the Scottish expedition to Panama under William Paterson in 1695, see **DARIEN**.

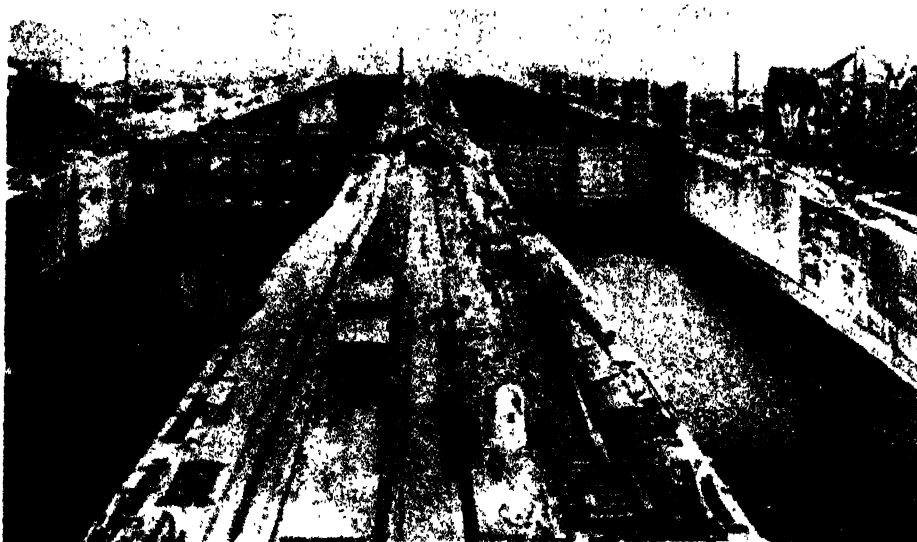
Spanish rule over the isthmus ended in 1821, when Panama achieved independence and voluntarily incorporated itself in the old Republic of Colombia, formed by Venezuela, New Granada, and Ecuador. After the dissolution of Greater Colombia, Panama remained a part of New Granada. In 1855 Panama was organized as an autonomous State, but in 1886 was incorporated as a province of Colombia.

In November, 1903, after a bloodless revolution, Panama declared itself an independent republic. The United States immediately recognized the new government and concluded with it a treaty setting aside for American uses the Canal Zone.

Panama declared war on Germany 7th

miles, which includes 163 sq. miles covered by the artificial Gatun Lake, the reservoir for the Canal. The population in 1933 was 29,636, including 2587 Americans and many West Indian negroes.

The Canal was begun in 1881 by the French engineer, de Lesseps, as a sea-level canal and abandoned in 1889. The failure was due largely to the ravages of malaria and yellow fever. In 1902 the United States acquired the works, and spent two years improving sanitary conditions and combating disease. In August, 1914, the Canal was opened, but the official opening was deferred until 1920. The Canal is 42 miles in length from shore to shore. Over 30 miles are at a summit level of 85 ft., reached at either end by a series of three locks, each of which is in duplicate. This central portion runs through the artificial Gatun Lake, in which ships follow a fixed channel formed by



GATUN LOCKS IN THE PANAMA CANAL

Photo: U. & U.



GATUN LOCKS FROM THE AIR

In the foreground is part of the Gatun Lake.

Photo: U. & U.

the bed of the Chagres River, whose upper waters form the reservoir. The Gaillard Cut through the continental watershed is 8 miles long. Each lock is 1000 ft. long, 110 ft. wide, and 70 ft. deep. The cost of the construction of the Canal was \$539,200,000. The revenue from dues in 1934-35 was \$23,300,000, and the cost of operation in the same year was \$9,300,000. In 1934-5 the Canal was used by 5180 vessels, of which 2143 belonged to the United States and 1170 to Britain. The transit occupies about eight hours.

PANCREAS, *pan' kre as*. An important digestive organ which plays a part in assimilating proteins, starches, sugars and fats. It is a gland 6 or 8 in. in length, about 1 in. thick, and 1½ in. wide. It lies crosswise and behind the stomach, and communicates with the intestinal tract by means of a duct which extends throughout its length. The contents of this duct are discharged into the duodenum, which meets the pancreas at the right end of that gland.

Scattered throughout the pancreas are small islands of glandular tissue, which pour their secretion into the blood stream rather than into the intestine; it is these which furnish the internal secretion of the pancreas, known as *insulin*. That substance, only recently discovered, is needed for the combustion of the sugar circulating in the blood stream. If there is insufficient insulin formed by the pancreas, the sugar in the system is not burned, but accumulates in the blood and in the body tissues. This condition gives rise to the disease known as *diabetes mellitus*. See **DIABETES**.

PANCREATIN, *pan' kre a tin*. A yellowish-white powder sometimes prescribed as a digestive agent. It is a mixture of the elements, or ferments, found in the pancreatic juice. Natural pancreatin contains *trypsin*, a ferment which digests meat, eggs and other proteids; *amylase*, which turns starch into sugar; *steapsin*, which emulsifies fats; and the enzyme which curdles milk.

PANDEMIC, *pan dem' ik*. See **EPIDEMIC**.

PANDORA. In Greek mythology, the first woman created. Zeus, being angered with Prometheus because the latter had stolen fire from heaven, resolved to avenge himself upon man. He called upon Hephaestus to fashion a being in god-like form from earth and water. All the gods joined in endowing the new being with attractive qualities, or those adapted to make mischief. Pallas gave her artistic knowledge, Aphrodite contributed beauty, and Hermes made her artful and designing. The Graces and the Seasons clothed her, and Zeus christened her Pandora, or "all-gifts."

According to one legend, the new creation

was sent to Prometheus, who received her coldly. Then Hermes took her to Epimetheus, who married her and was happy until Hermes brought a box which he confided to the care of Pandora, with strict injunctions that she should not open it. Her curiosity, however, was too strong, and she undid the fastenings. Then at once there burst out all the vices, sins, crimes and



PANDORA

Statue by Bates, now in the Tate Gallery.

Photo Mansell

sufferings that can afflict man, for Zeus had included in its contents all the ills of the world. Frightened at what she had done, Pandora shut down the lid in time to preserve for man Hope, which always follows suffering.

PANDULPH, CARDINAL (d 1226). When John had refused to acknowledge Stephen Langton as Archbishop of Canterbury and had defied the papal interdict, Cardinal Pandulph or Pandolfo was sent to England by Innocent III in 1211. He pronounced excommunication against John. Two years later he returned to accept John's submission, and it was he who received the crown of England and later returned it to John as the Pope's vassal. He averted the French invasion and gave valuable assistance to the King, who made him Bishop of Norwich. The regents of Henry III had to submit to his dictates until 1221, when he was recalled to Rome.

PANELLING. A decorative form of woodwork found in nearly all types of architecture, even in the earliest days of wooden buildings, being used for ceilings, walls and doors. It

is also used in making certain articles of furniture. Originally the word indicated a board with a surrounding frame, but the construction of panelling now takes various forms. Many wonderful and artistic creations, with which the skill of the carver has been combined, exist in ancient churches and mansions of Europe. Skeleton panelling consists of a wood frame only, the centre-piece being of silk or some other fabric. False panelling is the laying on of a special moulding; artificial panelling, in which moulded paper is used, is popular with decorators who wish to produce effects economically.

PANGOLIN (OR SCALY ANT-EATER). A small toothless animal belonging to one of the lowest orders of mammals (Edentata). Pangolins are long-tailed, covered with horny scales, and live mainly in trees; they are found in Africa and India. If attacked, the pangolin rolls itself into a ball.

Scientific Name: *Manis tricuspis*.

PANKHURST, EMMELINE (1858-1928). An English militant suffragist. Her father, Richard Goulden, and her mother zealously advanced the doctrine of votes for women



EMMELINE PANKHURST
Photo: Brown Bros.

when the movement in England was in its infancy. Their daughter Emmeline was born in Manchester and educated there and in Paris. In 1879 she married Dr. Richard Marsden Pankhurst (died 1898), and became the mother of five children. She was one of the founders of the Women's Franchise League, organized in 1889, and of the powerful Woman's Social and Political Union, founded in Manchester in 1903. It was about two years later that she and her followers inaugurated militant tactics in furtherance of their cause.

At first this militancy only went as far as "heckling" public speakers, the organization of monster parades, and various demonstrations regarded officially as disturbances of the peace; but after 1912, when the hostility of the Cabinet to the cause was apparent, a new campaign was inaugurated. The militants began to set fire to buildings, damage golf links, pour noxious fluids in post boxes, and break the windows of public buildings. Mrs. Pankhurst, the chief instigator of these outrages, was sent to prison early in 1913 as an accomplice in a plot to

destroy Lloyd George's country home with a bomb. Hunger strikes and enforced feeding seriously injured her health, and she was soon released, only to be committed for a new outrage. In 1913 Mrs. Pankhurst succeeded in making her way to Paris. From there she sailed to America, where she engaged in a lecture tour before returning to England. During the World War, militant tactics were given up because of patriotic sentiment, and in 1918, when partial suffrage was granted to English women, the suffragettes saw their aim largely accomplished.

Mrs. Pankhurst's two daughters, Sylvia (born 1882) and Christabel (born 1880), are both active workers for political equality.

PANSY. A cultivated species of viola (or violet) which has exquisite, velvety blooms of purple, violet, blue, yellow, white and brown. The popular pansy is a hardy plant but requires moisture and shade from the noonday sun, being apt to wither in dry conditions. It is readily grown from seed.

Classification. The violet family is *Violaceae*. Pansy is a descendant of *Viola tricolor*.

PANTALOON. See PANTOMIME.

PANTHEISM. The belief that God and the material universe are one and the same thing, and that God does not exist as a separate spiritual being. Spinoza was the most prominent of modern philosophers who accepted this doctrine. In the poetry of Wordsworth, Bryant and other Nature poets there are suggestions of a pantheistic view of God and the world.

Derivation of Term. The term is derived from the Greek *pan*, all and *theos*, god.

PANTHEON. The best preserved of the buildings of ancient Rome; the name, meaning "of all the gods," was applied by the Romans to any temple dedicated to all their deities, and hence to the circle of deities themselves. The famous Pantheon of Rome is on the site of a temple built in 27 B.C. This edifice was struck by lightning in the reign of Trajan. Hadrian, in A.D. 123, built the existing structure, but it was subsequently altered and improved by Septimius Severus



Photo: Visual Edu.

and Caracalla. It is circular in form, 142½ ft. in interior diameter, and possesses a great dome, the apex of which is 142 ft. above the



THE PANTHEON AT ROME
Photo: OROC

floor. The only light which enters the building comes from a window, 27 ft. in diameter, at the summit of the dome. A most striking feature is the portico, with its sixteen great Corinthian columns, each hewn out of a single stone. The portico is the only part of the temple built of the original materials. The Pantheon has been used since the seventh century as a Christian church. Raphael, Annibale Carracci, Victor Emmanuel II, and Humbert I are among the great Italians buried there.

PANTHER. A name used somewhat loosely to designate certain members of the cat family. It is applied to the *leopard*, which is a native of Asia and Africa, and to the *puma* of North America (also known as *cougar* or *American lion*).

PANTOMIME. A term derived from the Greek (*pan*, all; *mimos*, mime) and applied to the action in early types of play where mimicking by gesture was the important element. Where pantomime was first employed is unknown; it reached widely different stages of development at different



PANTHER
Photo: Bond

times and places. In the first age of the Roman Empire it was very popular, no narrative was employed, the play being acted



GIANTS' HEADS FOR A PANTOMIME
Photo: Fox

by gesture and dancing, accompanied by music, and the actors wore masks.

The pantomime in vogue in England during the eighteenth century was introduced from Italy. The actors always represented conventional characters and names. There

protectorate. Paoli was out of sympathy with this move and with the British Governor, General Elliot. Before the British had been driven out by the French, he was made to withdraw to London, where he lived as a pensioner of the Government.

PAPACY. See POPE.

PAPAL GUARD. See SWISS GUARDS; VATICAN.

PAPAL STATES, THE. In all ages, piety and fear have caused gifts of land to religious foundations, and the triumph of Christianity inevitably brought wealth to the Church. The fall of the Roman Empire of the West did not immediately break the habit of looking to Rome for leadership, and it was natural that the Pope should have become the lord of much territory in the neighbourhood of Rome. This acquisition of temporal power has been censured as unworthy of the representative of Saint Peter, but it must be remembered that the vast charitable works of the Church required wealth and that the ecclesiastical authorities were good and kindly land lords. Ravenna passed out of the hands of the Eastern Emperors to those of the Pope, so that the Papal States came to comprise most of Central Italy.

Papal policy was strongly affected by the possession of those States, and many of the wars of ambitious Popes were fought to defend their lordship; this was the chief cause of the struggle with the Normans of southern Italy. Enemies of the Papacy used to intrigue with the turbulent smaller nobility among the Papal vassals, there were occasions when the Pope commanded less authority in his capital city than in Europe. At the close of the fifteenth century, Cesare Borgia crushed the nobility and put the States under a firm, and mainly just, central government, but his apparent intention of making the Papal fiefs into a hereditary realm was defeated by the death of his father, Alexander VI. Julius II restored the temporal power in Italy. Ferrara was annexed by Clement VIII at the close of the sixteenth century, and Urbino by Urban VIII, Pope from 1623 to 1644.

The eighteenth century saw a decline in Papal authority and encroachments on Papal territory, until, in 1798, French troops occupied the States and declared them to be a Republic. In 1809 Napoleon announced their annexation to the French Empire, their independence was reasserted at the



A SCENE FROM "THE FORTY THIEVES"

A pantomime produced at the Lyceum Theatre, London.

Photo Central

was usually a *Harlequin*, or clown; an amiable but stupid father, *Pantaloone*; a sprightly daughter, *Columbine*; and so on. The performance was of the vaudeville order, interspersed with music, dancing, and acrobatic feats. The modern pantomime has essentially the same character, though the use of the traditional names has been given up. See DRAMA.

PAOLI, *pah o' li*, PASQUALE (1725-1807) A Corsican "nationalist" leader. The island had long suffered and revolted under Genoese rule; the elder Paoli was also a patriot. The whole family was exiled, and Paoli learned soldiering in the Neapolitan cavalry. In 1755 he returned to lead his countrymen and drove the Genoese out of all but a few strongholds. He organized a remarkably liberal constitution, which his own popularity kept from weakening his authority, founded a University at Corte, and encouraged agriculture. In 1768 Genoa sold Corsica to France, and within a year the desperate resistance was broken. Paoli fled to England, where he was warmly welcomed. He was allowed to return in 1791, becoming governor and military commander of Corsica. In 1793 the Corsicans split into Republicans and followers of Paoli, who had been outlawed by the Revolutionary Government. In 1795 Britain was asked to establish a

Congress of Vienna. Their internal administration was reorganized on a system which reserved office for those in orders. This conflicted with the democratic and parliamentary theories which were then beginning to sweep Europe, and 1830 and 1848 saw risings, only suppressed by Austrian troops. Pius IX made concessions, but became unpopular in his own dominions when, as Head of the international Church, he refused to join the new nationalist movement against Austria. Italian nationalism became increasingly anti-clerical. In 1860 much of the States was taken from the Church, and in 1870 Rome was seized by Italian troops. The Papal States ceased to exist, and the Popes confined themselves to the Vatican. In 1929, by the Lateran Treaty, the City of the Vatican was acknowledged as an independent State under sovereign control of the Pontiff. See LATERAN TREATY.

PAPER. Paper, which has become one of the world's most useful commodities, is the product of centuries of study, experiment

from which paper is made are rags, straw, esparto, jute, hemp, old paper and various woods; but three-fourths of the entire output is now manufactured from wood pulp. Poplar is considered the best wood for pulp. The value of rag paper is a little higher than that of paper made from wood. Cotton and linen rags were the first material of which paper was made, the process then being almost exclusively a handicraft. The rags were cleaned, soaked, reduced to a pulp by beating and grinding, and floated on water that was kept in motion to distribute the fibres evenly. The felted pulp was removed from the water by means of shallow wire-bottomed boxes or *deckles*, and, when drained, laid on pieces of woollen felt in alternate layers, which were placed in a press to remove moisture, when quite dry, the paper was sized and smoothed by further pressure. To a large extent, machinery has now been substituted for hand labour.

Whatever the fibre used, the process



FIBRE FROM WOOD PULP, SHOWING FRAIED ENDS

Highly magnified photomicrograph. The actual length of a fibre is from one to three millimetre.

and invention. The first attempt to make a writing material of which there is any record was that of the ancient Egyptians, who prepared from the stems of the papyrus plant a material on which they recorded the deeds of their rulers and other royal personages. Many of these ancient records, called *papyri*, have been found in Egyptian tombs.

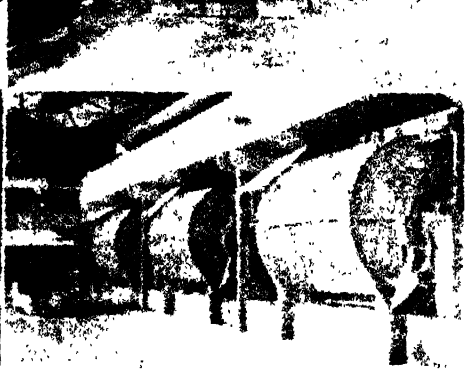
Another material was made from the skins of goats, sheep and calves, and was called *parchment*.

The Chinese manufactured paper at least two centuries before the Birth of Christ, and passed on their secret to the Arabs, who introduced the art into Spain in the middle of the twelfth century. By the second half of the fourteenth century, crude hand-made paper for literary purposes was in general use in Western Europe, and parchment was gradually superseded. The earliest preserved English manuscript bears the date of 1309, but paper was not manufactured in England until the beginning of the sixteenth century.

Manufacture. The chief raw materials

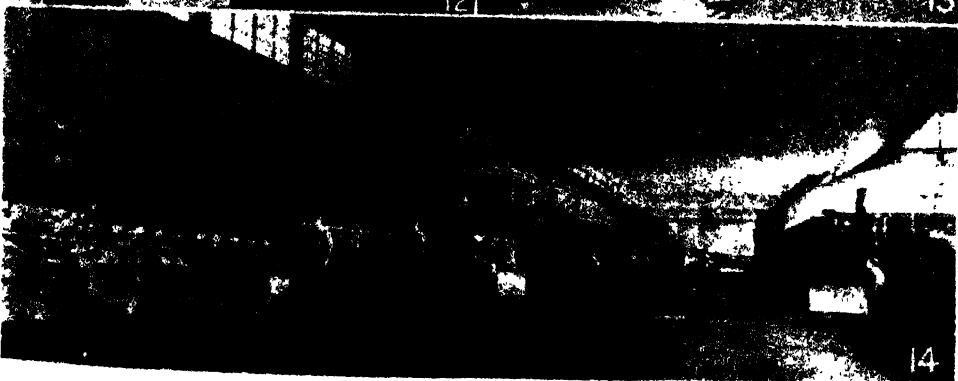
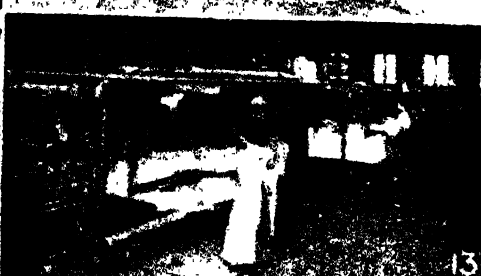
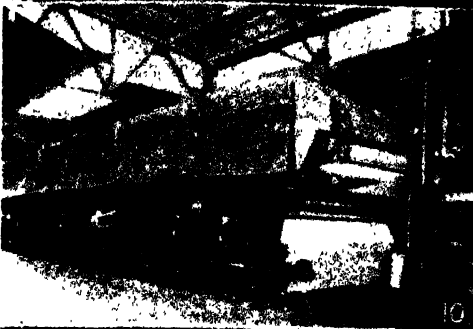
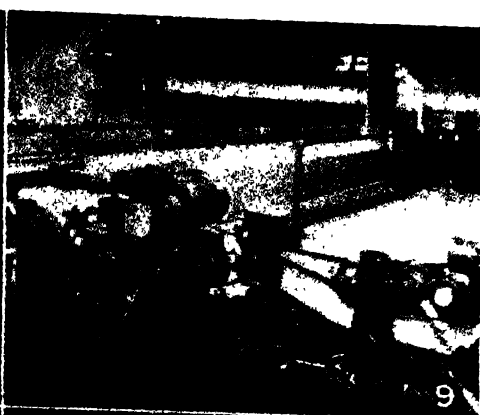
described above is essentially that used in making paper. When wood is substituted for rags, the first steps of the process consist in cutting logs and removing the bark. The wood is reduced to a pulp by grinding and by maceration in a beating engine. At this stage, colour, sizing and fillers are added to the material, which is termed mechanical pulp, and is used only for the commonest and newsprint paper. For better-class work, chemical pulp is used, either alone or mixed with other fibres, this is made by boiling wood in a solution of sulphurous acid and bisulphites (sulphite pulp), or in caustic soda (soda pulp).

The pulp, once refined, bleached and coloured, is ready for the paper-making machine, which consists of three essential parts: the "wet" part, the "drying" part, and the finishing rolls usually known as the calendar rolls. The wet stock is allowed to flow through a wide aperture upon a travelling endless wire screen with fine mesh. Rubber bands on the margin of the wire



PAPER MAKING (I)

1. Log-pond in front of pulping and manufacturing works in Canada. 2. Barking drum for removing bark from logs. 3. Logs stacked by pulping machines. 4. Vats for mixing the fibres. 5. Screens used to remove undesirable material from the pulp. 6. Washers in which the fibres are prepared for the paper machine. 7. Paper being formed on the paper machine.



PAPER MAKING (II)

8. The sheet is formed on a moving wire-cloth belt called a Fourdrinier wire. 9. The sheet is now formed and is ready for the dryer. 10. Moisture is removed from the paper as steam is drawn away from the machine, which is drying it by exhaust fans. 11. The paper is given a smooth surface by passing it through calender rollers. 12. On these rollers, paper for half-tone printing is given a highly finished surface. 13. The machine which slits and cuts the rolls of paper to sheet size. 14. General view of paper-making machine room. The raw pulp is placed in the beaters at one end, and finished paper is packed for dispatch at the other.

screen confine the pulp to the mesh; and by continual shaking, the water is removed from the pulp, whose fibres felt together to form a sheet, which is carried forward between the heavy rollers of the pressing machine, dried by steam-heated cylinders, and finally smoothed between the calender rolls. It is delivered to newspaper and magazine printers in massive reels weighing about 500 lb. each. For other purposes it is cut into sheets of various sizes.

The principle of the modern machine producing paper in an endless web is derived from the *Fourdrinier*, invented in England by Henry and Sealy Fourdrinier in the early years of the nineteenth century.

Classification. Paper is used for three purposes, namely, writing, printing and miscellaneous industrial use. Under the latter head, its chief uses are for wrapping, making paper boxes, etc. Linen paper is favoured for writing and for documents which have to be preserved for long periods of time. Most newspapers, magazines and books are manufactured entirely of wood-pulp paper, the quality being usually slightly better in the case of bound volumes. Manila paper is made from jute, hemp, and other stout fibres, there is on the market a so-called manila manufactured from wood. The variety known as "boards" is used largely in bookbinding. Straw paper is used for wrapping and similar purposes. The so-called *watermark*, by which most superior grades of paper are distinguished, is impressed on the web while it is passing over the rollers.

"Printings" are made in an extraordinary variety to suit the particular purpose and the process of printing adopted. Thus there are antiques, with rough surface; cartridge, in many qualities; coated—art, enamel, chromo—for half-tone and colour reproductions; imitation art—uncoated but highly finished; calendered and super-calendered—well finished, but suitable chiefly for the commoner classes of printing; newsprint, a low grade for newspapers, cover—rough-surfaced, stout papers for catalogue and booklet covers; and Bonds and Banks, used both for printing and typing purposes.

Paraffin (or "waxed") paper is made by running ordinary paper through a tank of melted paraffin, and then pressing the paper between cold steel rollers. Vegetable parchment is made by running the paper through a solution of sulphuric acid and other ingredients, then washing, drying, and finishing as in other papers. Both these varieties are waterproof, and the waxed paper is extensively used in wrapping food products.

World Production. At the present time, the United States supplies about half of the world's total paper, which amounts to over

20 million tons; of newsprint paper, Canada produces over 32 per cent, amounting to over 2,000,000 tons yearly, as well as exporting about 900,000 tons of wood pulp. From Canada, Newfoundland, and Scandinavia about 320,000 tons of newsprint are imported yearly into Great Britain, and about 640,000 tons are manufactured annually in British paper mills.

PAPER MONEY. See MONEY.

PAPER NAUTILUS. See ARGONAUT.

PAPIER MÂCHÉ, *pap' yeh mash eh*

Translated from the French as "pulped paper," this is the name of a substance made of paper pulp, mixed with oil, glue, paste, resin, or some other sizing, to make it hold together when dry. Copperas, quicklime, and white of egg is added when it is desired to make the substance resist water, and the addition of borax and phosphate of soda renders it fireproof. Papier mâché was probably invented in India, China and Japan.

For some purposes, papier mâché is made by gluing together sheets of paper and pressing the damp sheets into a mould. For other purposes, sheets of cardboard or balsa board are similarly treated, but the ordinary quality is made from scrap, waste paper or wood pulp, to which quantities of glue, chalk, clay, and sand are added.

There are many uses for papier mâché. It is moulded into masks, dolls' heads and other toys, trays, bowls, relief maps, architectural models, anatomical models, picture frames, buttons, boxes, tubes, pails and numerous other articles of common use. One of the most important uses is as a mould for stereotype plates in the printing industry.

PAPILLA, *pā pil' ā.* See HAIR, EYELASH.

PAPILLON. This dog is small, less than 12 in. at the shoulder, and less than 12 lb. in weight, and he comes into the toy class. The name, meaning "butterfly" dog



PAPILLON
Photo: Fall

refers to the large ears, which, pointing outwards, are supposed to resemble a butterfly with open wings. The ears may be carried pricked or falling, but are always very well fringed, as are the front paws and tail, which is long, and carried like a squirrel's. The coat, long and silky, may be (1) unicolour—of any colour provided it is pure, although the tawny shades may be smutty; (2) two-coloured—white thrown into relief by patches and ticking; or (3) tricolour—similar to the two-coloured, except that the white is thrown into relief by spots or patches, or both, of two colours.

In general appearance he is a graceful little dog, slender, smart, very lively and intelligent, with a small skull, fine pointed muzzle and round dark eyes. The body is rather elongated, the back fairly long and straight.

PAPRIKA, *pap'rika*. A favourite Hungarian condiment, prepared from the pods of cultivated capsicum (which see). After the seeds have been removed, the pods are dried and powdered. Paprika has a bright-red colour, but is less pungent than red or cayenne pepper, and has a sweeter taste. It is largely used for seasoning dishes prepared from a combination of meats and vegetables, such as goulashes, stews, etc., and is also employed in salad dressings.



DRYING PAPRIKA
Photo: OROC

PAPUA. The old name for the island of New Guinea (which see).

PAPYRUS, *pa pi'rus*. This reed-like water plant was used by the ancient Egyptians for a variety of practical purposes in addition to the most important one, the manufacture of papyrus paper for writing. It served also as a material for mats, sandals, and sailcloth for light skiffs. From the brownish flowers were made garlands to adorn the shrines of the Egyptian gods.



PAPYRUS IN CENTRAL AFRICA
This species is of no value for paper making
Photo: Cherry Kearton

The papyrus or paper of the Egyptians was made of strips of the stem arranged in layers and pressed together. In the earliest times, papyrus paper formed long rectangular sheets which were gummed together to give a writing surface the required size. The writer used a reed for a pen, with red or black ink. The written sheets were rolled and tied with thread. The rolls and sheets varied in dimensions; in many instances, they reached a length of 144 ft.

For a long time, the city of Alexandria jealously guarded its monopoly of preparing the paper, and the refusal of the Egyptians to supply it to Europe was one of the causes which led to the employment of substitutes. After the twelfth century, papyrus was altogether superseded by parchment and by paper made of rags.

The plant is now nearly extinct in Egypt, but still grows wild in the Sudan. The "paper" papyrus has large, straight stems, which grow from 3 to 10 ft. in height. These bear no foliage whatever, and the coarse, sharp-edged leaves spring directly from the rootstock. The flowers are lacking

in both sepals and petals, and are surrounded by bristles.

Scientific Name. The papyrus belongs to the sedge family, *Cyperaceae*. The best known species is *Cyperus papyrus*.

PAR. This is a Latin word signifying "equal" and denoting the nominal value of stocks and shares, etc., or that amount of currency of one country which is equal to a certain amount in the currency of another, supposing the currencies of both to be of the same weight and purity. The latter is the *par of exchange*. A £5 share, fully paid up, is at par when it will sell for £5 in the open market. If the market price is more than the nominal or face value, the stock is said to be "above par" or "at a premium"; if less, it is "below par" or "at a discount."

PARA, pah'-a. A standard coin of Turkey, one-fourth of a piaster.

PARA. See BRAZIL.

PARABLE. An illustration by means of a comparison; the term is more particularly applied to stories about ordinary people, things or incidents, which are designed to convey a spiritual meaning or lesson. The parable differs from the allegory in not allowing the introduction into the story of mythical beings or magical occurrences, and from the fable in being free from such unreality as that of animals conversing with one another.

In the form in which the parable is most familiar, it is of Eastern origin, and the finest examples are in the Bible. In the Old Testament there are but few. Jotham's story (Judges ix. 8) of the trees choosing a king is a fable. But Nathan's moving story of the ewe lamb told to David (II Sam. xii) is a true parable, and the apologues of the wise woman of Tekoa (II Sam. xiv. 5 ff.) and of the prophet to Ahab (I Kings xx. 39, 40) are of the nature of parables.

The parables of Jesus have the qualities which make them perfect examples, and the names of many of them have become household words in every Christian country. Perhaps the four most striking are those of "The Good Samaritan," "The Ten Virgins," "The Rich Man and Lazarus," and "The Prodigal Son."

Jesus Himself gives the interpretation of the parables of "The Sower" and "The Wheat and the Tares," but the meaning of most of them was left to the instinct and conscience of His hearers.

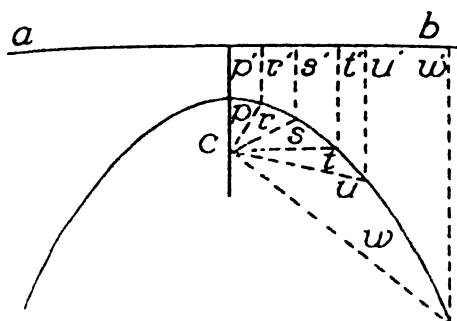
PARABOLA, par-ab'-o-la. Exactly defined, a parabola is a curve in which every point is equally distant from a certain fixed point and a certain fixed straight line. Another definition of a parabola describes it as the section of a *right circular cone* made by a plane parallel to a line on the slanting surface of the cone.



PARABLE OF THE TEN VIRGINS

This altar-piece at Lyndhurst Church, Hampshire, is by Lord Leighton.

Photo: OROC



PARABOLA

Any point on the curve is as far from the line ab as it is from the point c . Thus p equals p' ; r equals r' , etc.

The parabola was studied and named by Apollonius, the Greek geometrician of the third century B.C.

PARACELSUS, *par' a sel' sus* (about 1490-1541) A German physician. He was born in Switzerland, attended the University of Basel for a brief period, and then studied chemistry and alchemy under the Bishop of Wurzburg. From 1526 to 1528, he lectured at the University of Basel, but was dismissed because of his denunciation of existing methods in medical practice. Thereafter he lived a wandering life, meeting opposition to his theories wherever he went.

Paracelsus deserves honour as an original investigator. He showed the fallacy of the accepted belief that people were made sick by too much or too little bile or blood, and he laid the foundation for the later method of curing diseases by specific remedies. He introduced into medical practice, among other remedies, sulphur, iron, arsenic, opium and mercury. His death occurred at Salzburg.

PARACHUTE, *par' a shoot*. An apparatus in the form of a large umbrella, used to break the fall of a person from aircraft or from any great height. After balloons were invented, parachutes were used as a means

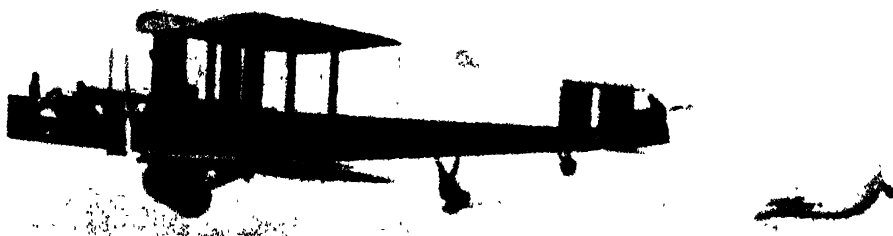
of descent from them. The parachute was attached by means of a rope to the basket below, and remained closed when the balloon rose, but when the descent began it was cut loose.

The modern parachute is usually of the seat-pack type. The pack, which is about the



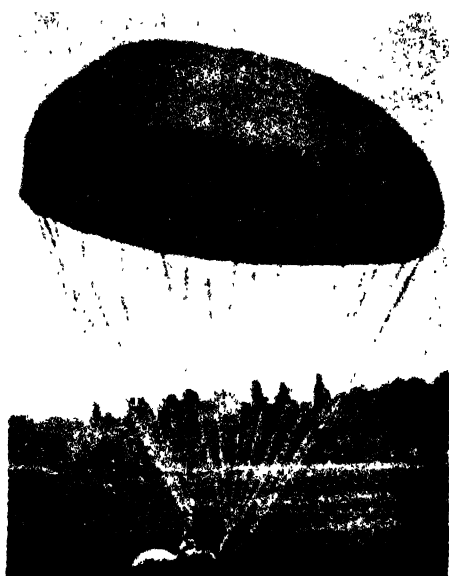
ON WING PLATFORM, PREPARING TO JUMP
Photo: Fox

size of an ordinary chair cushion and twice as thick, is strapped to the aviator so that it forms a cushion when sitting in the plane. Almost immediately after the aviator leaps from the aeroplane, he pulls the "rip cord" and a small "pilot" parachute is released. This immediately fills with air and pulls out the large parachute (about 24 ft. in diameter), and is designed to prevent entanglement with the cords of the larger as it opens.



LEAVING THE AEROPLANE THE PARACHUTE BEGINNING TO OPEN
Photo: Fox

The parachute has no small possibilities as a weapon of war, and particularly in Soviet Russia, mass descents of large numbers



LANDING
Photo: Fox

of troops from 'planes have been successfully carried out in manoeuvres.

PARADE. To form or assemble in military order, to march or move in military array; the term is often used as a noun meaning a military display, or as denoting the parade-ground. A soldier is bound to attend all parades ordered by his superior officer, and if charged with *absence without leave*, the time at which he should last have been on parade determines the time of the commencement of his absence.

All meals, roll-calls and *Reveille* are parades, in addition to daily drill or training parades. The word is derived from the French.

PARADISE. A word from the Persian, borrowed by the Greeks, and originally used to denote the pleasure grounds of Persian kings. Translators of the Old Testament applied it to the Garden of Eden, but the early Christians used the name in connection with the future dwelling-place of the blessed dead.

PARADOS, *par' a dos.* A protection built up behind a trench to provide a back-ground for the heads of the defenders, and to protect them from the back-blast or splinters of shells. (The derivation is partly Greek and partly French—*para*, against; *dos*, back).

PARAFFIN. A hard, white tasteless and odourless organic substance that resembles wax, and is used extensively in making candles. For this purpose it is mixed with small quantities of stearin (which see). It is employed also in the manufacture of matches and of wax paper, is used to give weight and lustre to calicos and other fabrics, and to extract oils from plants and flowers. Although paraffin occurs in nature in the mineral ozocerite, the greater part of the commercial product is obtained by distillation from petroleum. In Germany, it is prepared by distillation of various kinds of brown coal, and in Scotland, an important centre of the paraffin industry, it is manufactured from Boghead coal and bituminous shales.

Paraffin oil, benzine, and asphalt are important by-products obtained in the manufacture of paraffin. The commercial importance of paraffin dates from 1851, when the Scottish chemist, James Young, perfected a practical method of manufacture.

In chemistry, *paraffin* is a general term for a group of hydrocarbons (which see).

PARAGRAPHTA. See **APHASIA**.

PARAGUAY (*-gwai*). A South American republic, enclosed by Brazil, Argentina and Bolivia. It has an area of 61,647 sq. miles, but in addition claims 100,000 sq. miles known as the Chaco, a claim which disputed by Bolivia, resulted in war in 1908 and again in 1934-5, and still remains unsettled.

The total population was estimated at 902,000 in 1934, including 67,500 in the Chaco, of whom 15,000 are uncivilized Indians. The people include Europeans, chiefly Spanish, *mestizos* and civilized Indians. There are no negroes, and immigration is slight. The aboriginal Indians, the Guaraní, are now extinct.

Roman Catholicism is the established faith, but all religions are allowed. Education is free and normally compulsory. There are about 2000 schools and a small university.

The Cities. There are many small towns such as Villarrica, with a population of 35,760 (1934); Luque, 16,000; Carapeguá, 17,000; and Concepción, 14,000.

ASUNCIÓN, officially known as the city of *Nuestra Señora de la Asunción*, the capital and chief port, is on the broad Paraguay River, 970 miles by river almost due north of Buenos Aires.

Asunción was for more than a century the capital of all Spanish territory in Eastern South America, and the southern outlet for the gold and silver of Peru.

It is the chief centre of trade for Paraguay.

A line of river steamers connects the city with the outside world, and since 1913 it has had railway connection with Buenos Aires.

The city and suburbs have a population of 228,600 (1930).

Physical Features. The upper Paraguay River separates the country into two distinct regions. That between the Paraguay and Paraná rivers, known as Paraguay proper, covers an area of about 62,000 sq. miles. Much of it is an upland region, an

but temperate for the greater part of the year, and, with a moderate rainfall, is agreeable and healthy.

Products and Commerce. The soil of Paraguay is rich but practically undeveloped. The forests and hillsides yield the *yerba maté*, or Paraguay tea, which is the chief article of export.

Cotton-growing is a rapidly developing industry. The cultivation of sugar cane, especially for distillation purposes, promises



ASUNCIÓN
Victoria Botanical Gardens.
Photo U & U

extension of the Brazilian plateau. It is chiefly pastoral, but there are forests in the lowlands. West of the upper Paraguay lies a vast plain, known as the Chaco, of some 100,000 sq. miles of extensive pasture lands and valuable forests, largely unexplored. The title to this region is disputed by Bolivia.

The Pilcomayo River, which flows down from the north-west through a region of low, wet, wooded or grassy plains, is navigable in both its upper and lower courses, but shallow in its middle course. The Paraná River, which forms the south-eastern boundary of the country, has a succession of cataracts, and for a hundred miles is a continuous chain of rapids.

The climate is sub-tropical, hot for three months—December, January, and February,

well. Though the methods employed are primitive, grains, rice, tobacco and oranges flourish.

One of the most profitable branches of agriculture is the breeding of livestock. In 1933 the number of cattle was estimated at over 4,000,000.

The forests of the Chaco are noted for *quebracho* timber, the most valuable source of tannin. Iron, manganese, copper and other minerals are found in abundance. Petroleum is also found in commercial quantities. There is little manufacturing outside of sugar and the meat industry, which includes packing and curing of meats and tanning of the hides. The chief exports are hides, maté, oranges, sugar, tobacco, timber, tinned and preserved beef, and cattle, and they go principally to Argentina, Uruguay

and the United States. The imports are textiles, flour and wheat, machinery and oil.

The navigable rivers for years have formed the principal means of transport, supplemented by bullock carts for overland transport along the rough trails, for most of the country roads are mere cow paths. Paraguay has only about 669 miles of railway.

Mode of Government. The President, chosen directly by the people, is assisted by five Ministers. The legislature consists of a Congress of two houses—a Senate of twenty members, and a House of Representatives with forty members, all elected directly by the people.

until his death in 1862, although he abandoned the idea of national isolation and adopted some liberal reforms. Then a third member of this family, F. Solano Lopez, wrought the final tragedy of his people by waging a disastrous war with Brazil, Argentina and Uruguay for five years (1865-1870). In his final retreat he destroyed, as far as possible, all the property of his own people. This misguided ruler and his last remaining force of 470 men were slain in the swamps of Aquidaban in 1870, and peace came at last to a ruined land. It was practically a land without men. Out of the population five-sixths were lost, only



ALONG THE PARAGUAY RIVER
Photo U. S. U.

History. Paraguay had its beginnings with the founding of the city of Asunción in 1535 by De Ayolas. After his death Spanish influence declined. Peru considered Paraguay as a province in the viceroyalty of Peru, but exercised only nominal control.

Missionary activities of the Jesuits, which extended from 1609 to 1768, dominated the history of Paraguay for that period. They tamed the wild savages and made them peaceful, industrious and obedient. The Jesuits were expelled in 1769 by act of the king of Spain, and their work was undone to a very great extent, many of the people lapsing into barbarism. In 1776 Paraguay became a part of the viceroyalty of Buenos Aires.

Independence from Spain was secured in 1811. The Presidency of the new republic fell to the despot Dr. Francia, who ruled with a rod of iron. He cut Paraguay off from all outside intercourse, even going so far as to close navigation on the Paraguay River. On Francia's death in 1840, his nephew, Antonio Lopez, carried on a similar despotism

about 200,000 remaining, mostly women and children.

A new Constitution was adopted in 1870 and after six years the Brazilians withdrew their forces, but frequent civil wars have checked the progress of Paraguay.

The establishment of railway communication with Buenos Aires in 1913 has done much to lessen the isolation of the country.

The ownership of the vast Chaco territory, which lies between Bolivia and Paraguay, has been a source of constant friction between the two nations. In August, 1931, border raids began which were the forerunner of the wars of 1932 and 1934. The League of Nations made vain attempts to stop the latter struggle, in which neither side gained the ascendancy. An armistice was signed in June, 1935, and Paraguay left the League in the same year. In February, 1936, a military revolt broke out; President Ayala fled, and Col. Rafael Franco was elected in his stead.

PARALLAX, *par' a lax.* In astronomy, the difference in direction of a heavenly body

as seen from two different points. Parallax is illustrated in a simple way in Fig. 1. The post p is directly in front of a house, but when viewed from a , it is in line with the corner a' , and when viewed from b , it is in line with b' , that is, as the observer moves from a to b , the post seems to move from a' to b' . When viewed from c , the post appears in its true position in reference to the house. The angle $a p c$ is the angle of parallax when the observer is at a , and the angle $b p c$ is the angle of parallax from b . As the observer approaches c , this angle

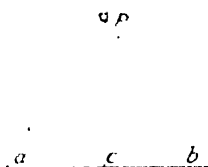
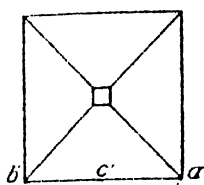


FIG. 1

ILLUSTRATIONS OF PARALLAX

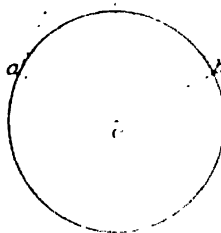
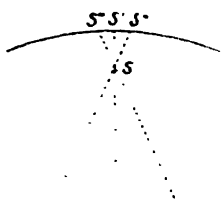


FIG. 2

becomes smaller and smaller until, when he is standing at c , it disappears.

Fig. 2 illustrates the parallax of heavenly bodies within the solar system. For convenience, all observations of the position of the nearest heavenly bodies are referred to the centre of the earth, c . The object s , could it be viewed from c , would appear in the sky as at s' , its desired position. When viewed from a , it appears at s'' ; viewed from b , it appears at s''' . The angles of parallax are $a s c$ and $b s c$. To find the distance of s , simultaneous observations of its position may be made at two widely separated places, as a and b . Using the results of these observations, and knowing that $a c$ and $b c$ are equal to the radius of the earth, one can determine by trigonometric computation the distance of the object from the earth.

In computing distances of fixed stars, the radius of the earth's orbit must be used as a base line. The angle which this distance subtends at the distance of the star is the parallax of the star. See ASTRONOMY.

PARALLELOGRAM, *par a lel' o gram*. See QUADRILATEAL.

PARALLELOGRAM OF FORCES. A mechanical principle discovered by Newton; it is stated as follows: "If two forces act on a point and if lines be drawn from that point representing the forces in magnitude and direction, and a parallelogram be constructed on these lines as sides, their resultant will be represented in magnitude and direction by that diagonal which passes through the point." Although the resolution of two forces acting at right angles is the most common, in which case the parallelogram is a rectangle, the principle holds equally for any two forces acting on a single point.

PARALYSIS, *pa ral' is is*. A term indicating loss of the power of voluntary movement. This is in most cases the result of some disorder of the nervous system, as muscular movements are produced by the stimulation of certain nerve cells. The seat of disorder may be the brain or the spinal cord, or the nerves which supply the paralysed muscles. Many cases of paralysis are due to the brain disease known as apoplexy (which see). Inasmuch as the motor areas (those controlling movement) of each side of the brain correspond with muscular groups upon the opposite side of the body, trouble in the right side of the brain causes paralysis on the left side of the body, and vice versa. Injuries to the skull and abscess and tumour of the brain are other causes of paralysis. In case of injury to the spinal cord, the patient ceases to have the power of movement of all muscles supplied by nerves which originate below the point of injury. There are certain diseases of the cord, notably infantile paralysis and spinal meningitis, that cause loss of muscular movement. In some instances, though these are the exceptions, paralysis is a symptom of disease of the affected muscle.

Facial paralysis, involving one side of the face, occurs sometimes in new-born infants, owing to compression of the facial nerve from some difficulty in delivery; this seldom persists. It may also, of course, occur from injury to this nerve at any time of life.

Craft palsies form a group in which paralysis occurs, involving not a particular muscle or group of muscles, but some particular action which has been performed a very large number of times. Such is writer's cramp, in which a person whose work involves a great deal of writing gradually loses his power of writing legibly, owing to spasms and weakness of the hand, which for other uses is as efficient as ever. Craft palsies also occur in typists, pianists, hairdressers, cow-milkers, etc., and are due to fatigue in the brain of those nerve centres

which have been specially educated to perform the action in question. Prolonged rest from the action is necessary for cure.

Paralysis occurs also as a result of poisons acting on the nervous system, such as lead, alcohol, arsenic, and the toxin of diphtheria, this latter causes paralysis which is responsible for a large proportion of the fatalities in this disease.

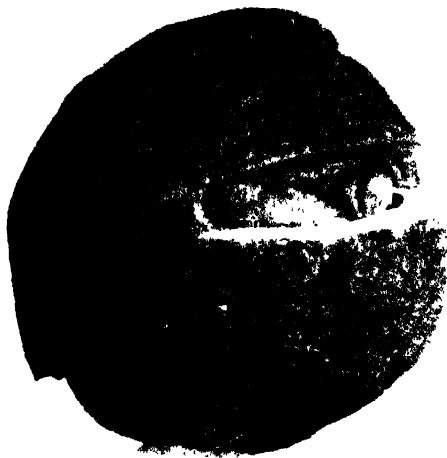
PARANA, *par a nah'*. Next to the Amazon, the largest river in South America. It is formed in the southern part of Brazil by the union of the Rio Grande and the Parana-hyba, and flows in a mainly southerly direction through Brazil, between that country and Paraguay, and between Paraguay and Argentina, finally through Argentina until it finds an outlet in the Atlantic Ocean via the estuary of the Plata. The total length of the river, from the confluence of the Rio Grande and the Parana-hyba to the ocean, is 2450 miles. For a distance of a thousand miles it is navigable for large river vessels. Ocean-going steamers sail through the Plata estuary and up the stream as far as Rosario, Argentina, 400 miles from the Atlantic.

PARANOIA, *par a noi' a*. Mental disease, characterized by delusions which become systematized, that is, they become permanently integrated into the mental constitution of the subject, who will therefore treat them as a part of his everyday experience, and will mould his conduct accordingly. The subject is usually a person of intelligence, often more than the average, and is attacked by the disease in middle life, say between 40 and 50 years. Hallucinations also occur, most commonly of hearing (voices, bells, and so forth), also of sight, and even of taste and smell. Apart from his delusions and hallucinations, the sufferer appears quite normal, though sometimes his friends will say that he has always been peculiar, or queer.

The commonest type of delusion is that of persecution, in which the subject is convinced that someone, it may be a friend or a stranger, or a well-known public man, or a class of people, is or are plotting against him; or he may refer to his enemies impersonally as "they." He will converse about his persecutors, and explain their plots in a most rational way, unless he finds his friends unsympathetic, when he may avoid the subject. This delusion is sometimes extremely dangerous, for he will set himself to be rid of his enemies, sometimes by physical violence, sometimes even by way of the law courts. As far as treatment goes, there is no prospect whatever of effecting a cure.

PARA (BRAZIL) NUT. The edible seed of a beautiful South American tree belonging

to the myrtle tribe. The tree grows as high as 150 ft., and is very abundant along the Amazon and Orinoco rivers. The cream-coloured flowers produce very hard shelled fruits, nearly 6 in. in diameter, and nearly the colour of a coconut. Each fruit



BRAZIL NUTS

As produced within the hard-shelled Para nut fruit, here shown cut open.

Photo Visual Education Service

contains about twenty of the well-known three-sided, wrinkled seeds or nuts, tightly fitted into the shell. These nuts, apart from their value as food, yield an oil employed in oil painting, lubricating of delicate machinery, lighting, and sometimes for cooking.

Scientific Names. This tree is of the family *Leguminosae*, order *Myrtales*. It is *Bertholletia excelsa*.

PARAPET. A low wall or bank constructed to protect soldiers in a fort or trench. In trenches, the parapet is made of earth, thrown out on the enemy's side in making the excavation. Also, a protective wall to prevent persons from falling off a roof or bridge. (The derivation is from the Latin *parare pectus*, to adorn or cover the breast.)

PARASITE AND PARASITIC DISEASES. A parasite is an organism, either plant or animal, which, during the whole or part of its life, obtains its nourishment from another living organism, known as the *host*.

All the microbes which cause disease are, strictly speaking, parasites, but as these form a science in themselves, viz. bacteriology, they will not be considered here. See article on **BACTERIA**.

In most cases, parasites cause more or less damage to the host, most commonly by

partially starving it, since they absorb its food when half-digested, as in the case of intestinal worms. In some cases parasites produce poisonous products, as the malaria parasite, others absorb a large quantity of blood, or ulcerate and perforate the wall of the host's intestine, or cause damage in other ways.

Of the animal parasites which cause disease in man, the most important are: (1) the *intestinal worms*, of which the commonest in this country are the round worm, bearing superficially some resemblance to an earthworm, the threadworm, which looks like a $\frac{1}{16}$ or $\frac{1}{8}$ in. length of white thread, and may occur in many thousands, and the tape worm, anything up to 20 ft. in length, having a tiny head, and hundreds of squarish flat segments joined end to end; (2) the *protozoa*, which cause malaria, sleeping sickness, amoebic dysentery, hookworm disease, and others; and (3) the so-called *ectoparasites* that live on the surface of the host (see below, also 2, 3, 33).

Plant Parasites. A host of plant diseases are caused by parasites of the vegetable kingdom. Fungi, for instance, are responsible for downy mildew on grapes and numerous garden vegetables, for stem rust of wheat and other grains, for black-spot canker of the apple, for smut of corn, and for potato blight, to mention but a few among hundreds. Mistletoe is a familiar parasite of forest trees, but it has green leaves with chlorophyll, and therefore makes part of its own food. Such a plant is said to be a *partial parasite*. In tropical forests are found many parasites which grow to large size and kill the trees upon which they live.

Diseases of human beings due to plant organisms form a class in themselves, being often serious. Among the malignant plant parasites is a yeast fungus that causes an eruption on the face and hands and elsewhere, often leading to disfigurement. The disease is called *blastomycosis*. Another fungus causes tumours and abscesses in the mouth and elsewhere. The disease, known as *actinomycosis*, is identical with lumpy jaw of cattle and other animals. Probably the most common of the fungous diseases of man is *ringworm*, of which there are several types.

Scabies and other skin diseases are caused by the presence of *mites*--microscopic creatures belonging to the spider family. Among the true insects causing skin diseases are the tropical *jigger*, *flea*, and *head and body lice*. The larvae of various flies are sometimes responsible for serious diseases within the body.

PARASOL. See UMBRELLA.

PARATYPHOID FEVER. A fever re-

sembling typhoid fever. Before the beginning of this century no distinction was recognized between the two, and all cases were classed as typhoid or enteric fever. Then it became recognized that there were two, and later three distinct infections, which are now known as typhoid, paratyphoid A and paratyphoid B. Of these three, typhoid tends to occur in more severe attacks, and is more likely to give rise to complications. It is customary for those proceeding to hot climates to be protected from these diseases by vaccine treatment; the vaccine is usually one with the three types mixed, and is often referred to as T A B vaccine. See TYPHOID FEVER.

PAR'AVANE. An anti-submarine and anti-mine device, invented by Lt. Commander C. D. Burney, R.N., during the World War. Constructed in the shape of a kite, it maintained a uniform distance from the vessel it accompanied. The anti-submarine design carries a charge of T.N.T. which explodes electrically on striking a submarine. The anti-mine type is designed to cut the mooring wires of mines, thereby compelling them to rise to the surface of the water, there to be destroyed. See MINE (Naval).

PARCELS POST. See POST OFFICE.

PARCHMENT. Material made from the skins of sheep, goats and other animals, used principally as writing material. The finer



PARCHMENT

An English craftsman shaving the skin to smooth out the surface and reduce the thickness.

Photo: Keystone

grades, called *vellum*, are made from the skins of calves, kids, and stillborn lambs. The word *parchment* derives from *Pergamum*, name of an ancient city in Asia Minor, where the material was made in former times. Writing on skins is older than recorded history; the earliest kings of Egypt used parchment. Papyrus, in fact, is of later date, and came into use because parchment was expensive. See PAPHYRUS.

Parchment is prepared by removing the wool or hair from the skin, placing the latter in lime to discharge the fat, then stretching it upon a frame and dressing it with knives and scrapers. Pulverized chalk is rubbed on with pumice stone, to smooth and soften the skin and to obtain a uniform thickness. The heavier parchment used for drum heads is made from the skins of asses, older calves, wolves and goats.

Parchment paper, or vegetable parchment, is made by dipping pure, unsized paper into a cooled mixture which consists of two parts of sulphuric acid to one part of water, then washing, and finally drying under pressure.

PARDON (IN LAW) The right of pardoning an offender, either before or after conviction, is one of the prerogative rights of the Crown and cannot be exercised by any one but the Crown. But even the Crown cannot exercise its right of pardon so as to take away any private right of a subject, therefore a pardoned offender is not freed from any civil liability he may have incurred to any one by his offence. (There is no power to pardon the offence of committing a person to prison outside the realm to evade Habeas Corpus, nor to grant pardon for a common nuisance until the nuisance be abated, nor can a pardon be pleaded as defence to an impeachment (which see.) Pardon may be either absolute or conditional, and is usually granted according to the advice of the Home Secretary on the recommendation of the trial judge, or on the petition of the criminal or his friends.

PAREGORIC, *par e gor' ik*. A solution containing two grains of opium for every fluid ounce of other ingredients. It is much used in making cough-mixtures.

PARENT AND CHILD. Between the present day and the time of the early Romans, when a father had power of life and death not only over his own children, but over his grand-children as well, there has been a revolution in public sentiment regarding children. Property right in children gradually gave way to guardianship, and to-day the welfare of a child is considered equal or superior in importance to the legal rights of others to control him. Some of this change in thought came early enough to be expressed

in English common law, which is followed in both the United States and Canada, but part of it is embodied only in statutes, which differ to some extent in the various countries, states and provinces of the British Empire and the U.S.A.

Parents' Rights and Responsibilities. The father of children, and also the mother—if she has property of her own—must support them, and either provide for their education or permit them to attend the schools provided by the State. The parents' responsibility for the child's maintenance continues up to the age of 16. Parents may inflict corporal punishment on their children at their discretion, provided it is with moderation. The Courts now have wide powers of interference to protect children from cruelty, neglect and moral contamination in their home life, and will, if necessary, remove a child altogether from the custody of its parents and place it in an "approved school." Much excellent work is done in this connection by Probation Officers, by the specially selected magistrates who preside over Juvenile Courts, and by the officials of certain charitable societies. Another great evil which legislative reform has now done much to remove is child labour. In former times parents were often driven by greed or economic necessity to send their young children out to work, often under appalling conditions. Now, no child may be employed at all under the age of 12—and no child under 14 may be employed during school hours or before 6 a.m. or after 8 p.m., or for more than two hours on Sunday, and local authorities have power to impose various other restrictions to prevent the exploitation of children in industry. In some countries children have definite legal rights to succeed to the property of their parents; but under English law, parents can, if they choose, cut their child out of their will, without even the proverbial shilling. See ADOPTION, GUARDIAN; JUVENILE COURTS.

PARHELION, *par he' le on*. A false sun, closely resembling the sun, and seen best when the sun is near the horizon. It is visible on either or both sides of the sun, and at distances of 22° and 46°. Parhelia are due to reflection and refraction of light by crystals of ice in the higher regions of the atmosphere. Parhelia may be double, triple, or even more numerous, and are always connected with one another by a white halo or circle. Similar phenomena connected with the moon are called *paraselenae*. See HALO.

PARIAH, *par' ia*, or *pair' ia*. Member of a low caste; an outcast. See CASTE.

PARIETAL, *pa ri' et al*, **BONES**. Two of the eight bones of the head (which see).

PARIS. In Greek legend, the second son of Priam, king of Troy. He was exposed on Mount Ida, but was rescued and reared by servants. As he grew to young manhood, Paris became famous for his courage and skill in protecting the shepherds from robbers. He was married to the beautiful nymph Oenone.

By his award of the Apple of Discord to Aphrodite, Paris became the object of the enmity of Hera and Athene. Later, Priam proposed to give as a prize to the winner of certain athletic contests the most beautiful bull in his kingdom. This animal was possessed by Paris, and was taken from him to Troy. Paris entered the contest to win back his bull and defeated all, even his own brothers. Cassandra then identified him as the son of Priam.

Priam shortly afterward sent him on a voyage to Greece. He went to the home of King Menelaus, during whose absence Paris won the affections of Queen Helen and carried her to Troy. Out of this episode the Trojan War developed. It was Paris who killed the heroic Achilles, who had come, on the invitation of Priam, to the temple of Apollo to ask for the hand of Polyxena. Paris was finally slain by the arrows of Philoctetes.

PARIS, FRANCE. Paris is the third largest city in Europe, ranking next to London and Berlin, with a population of 2,891,020 (1931), or with suburbs about four and a half million. The capital of France, it lies in the heart of the undulating northern plains, on both banks of the River Seine, 110 miles in a direct line from the mouth of the river. Versailles is 12 miles south-west, and Fontainebleau, with its celebrated château, is 35 miles south-south-east.

Plan of the City. A distinctive feature of the general plan of Paris is the system of boulevards. The greater part of the oldest section of the city is encircled by what are known as the *Grands Boulevards*, built upon the ramparts constructed in the fourteenth, sixteenth and seventeenth centuries. Beyond the *Grands Boulevards* are the old suburbs, and these in turn are enclosed by another circle of boulevards, coinciding with the ramparts of the eighteenth century. Outside of the latter are the newer suburbs (made a part of the city after 1860). Between 1840 and 1845, a wall over 20 miles long, with fifty-seven gates, was built around the city, but it was destroyed after the World War, together with the antiquated lines of forts, shown to be so useless in modern warfare. A wide circular boulevard replaced the old wall, and the site of some of the old fortifications was given over to parks and playgrounds.

The open squares of Paris are world-

famous. In the heart of the city, on the north bank of the Seine, is the celebrated Place de la Concorde, on the site of which Louis XVI and Marie Antoinette were guillotined during the Revolution (1792). In the centre of the square there stands the obelisk which, centuries ago, guarded the gateway to the Temple of Luxor in Egypt. Around the square are eight colossal figures symbolizing former provincial capitals, including Strasbourg, in Alsace.

Leading westward from the Place de la Concorde is one of the finest thoroughfares in the world—Avenue des Champs Élysées. This connects the Place de la Concorde with another famous square, the Place de l'Étoile. From the latter, twelve broad avenues radiate in all directions. The Champs Élysées is continued on the opposite side of the square by the Avenue de la Grande Armée. In the centre of the square is the colossal Arc de Triomphe, erected in commemoration of the victories of Napoleon. Beneath this arch lies the grave of a hero of the World War—an unknown soldier of France. The magnificent Bois de Boulogne lies about a mile west of the arch.

East of the Place de la Concorde is the Place Vendôme with Napoleon's Column of Victory, which is decorated with bas-reliefs illustrating scenes from the campaign of 1805. Another well-known square in the vicinity of the Place de la Concorde is the Place du Carrousel, containing another of Napoleon's great triumphal arches. The Place de la Bastille, on the site of the famous state prison; the Place de la République, with an imposing bronze statue symbolizing the Republic; the Place de Rivoli, containing a famous equestrian statue of Joan of Arc, the Place de la Nation and Place Saint Michel are other handsome squares.

Of the many gardens none is of greater historic interest than the Jardin des Tuileries, adjoining the Place de la Concorde on the east. The famous royal palace was destroyed in 1871 by the Communists, but the grounds have been converted into a beautiful public park. The garden is bordered on one side by a fine broad avenue, the Rue de Rivoli, and on the other by the swiftly flowing Seine.

Across the river to the south are the Gardens of the Luxembourg, with their palace and art gallery, the latter a museum of contemporary French painting and sculpture. On this side of the river, too, are the grounds of the Hôtel des Invalides (the home for old soldiers), beneath the dome of which rest the ashes of Napoleon; the Jardin des Plantes, and the Champ de Mars, containing the Eiffel Tower. From this, the tallest structure in Europe, a powerful radio station is operated.

Notable Buildings. The first public building in point of interest is the Louvre, notable for its art treasures. It extends along the Seine for half a mile and adjoins the east end of the Garden of the Tuileries. Originally the Louvre was connected with the royal palace, destroyed in 1871. North of it is the Palais Royal, built by Cardinal Richelieu about 1630. This edifice contains the

tion, and now houses museums of sculpture, antiquities, and ethnography. North-west of the Place de la Concorde are the Palais de l'Élysée, the residence of the French President, and the Palais des Beaux Arts (Palace of the Fine Arts), two beautiful structures erected for the Exposition of 1900. The Grand Palais houses the annual Paris Salons or exhibitions of art. On the south side of



PARIS FROM THE AIR
The Île de la Cité is in the centre.

offices of the Ministry of the Colonies. East of the Louvre is the Hôtel de Ville, built in French Renaissance style. It contains the offices where the municipal business of the city is transacted. Near by, on the islet in the Seine known as Île de la Cité, is the great Palais de Justice, headquarters of the law courts and police department. This structure contains the old Conciergerie, the prison in which Marie Antoinette and Robespierre were confined during the Revolution.

The Palace of the Trocadéro, across the Seine from the Eiffel Tower, is a huge oriental building in the form of a crescent. It was erected in 1878 for the International Exposi-

tion, and now houses museums of sculpture, antiquities, and ethnography. North-west of the Place de la Concorde are the Palais de l'Élysée, the residence of the French President, and the Palais des Beaux Arts (Palace of the Fine Arts), two beautiful structures erected for the Exposition of 1900. The Grand Palais houses the annual Paris Salons or exhibitions of art. On the south side of the Seine, in a direct line with the Louvre, is the Luxembourg Palace, referred to above, the building in which the French Senate holds its sessions. Near by is the Panthéon, which has by turns been a church and a temple of fame. The lower house of the National Assembly, the Chamber of Deputies, has its sittings in the Palais Bourbon, on the south side of the Seine opposite the Place de la Concorde. Of many theatres, the largest is the Grand Opera House, occupying an area of nearly three acres.

Churches. The largest and finest of these is the magnificent Cathedral of Notre Dame (which see), built during the twelfth and thirteenth centuries and restored between

1846 and 1879. The Church of the Madeleine is in the style of a Greek temple, surrounded on all sides with a line of Corinthian columns. The interior is walled and paved with marble, with decorations in gold and other rich colours. Through the stained-glass windows of the dome, coloured light shines on polished columns and on wonderful pieces of sculpture, fresco and painting. The Church of the Sacré-Coeur was erected on Montmartre, the highest point of Paris, in

collections. Other well-known institutions are the University (see below), the Sorbonne, College of France, School of Law, School of Medicine, the Observatory and the Botanical Garden (Jardin des Plantes). All of these institutions are situated in what is known as the Latin Quarter. Of the various libraries, the Bibliothèque Nationale (which see) is the largest and most famous.

Transport and Industries. Local transport is by means of electric tramways, an under-



1874-1891. Among other notable churches are the Sainte-Chapelle (1245-1248), containing stained-glass windows of unsurpassed beauty; and Saint Gervais, which was damaged during the World War by a German seventy-mile gun. The church has been carefully repaired.

Museums and Educational Institutions. The richest art treasures of the city are housed in the Louvre. In the Museum of the Luxembourg, adjoining the palace of that name, are kept the works of living painters and sculptors. These collections are the property of the State, and the finest works are transferred to the Louvre ten years after the death of the artists. The Cluny Museum, occupying the ancient mansion of the abbots of Cluny, the Carnavalet Museum, the Petit Palais des Beaux-Arts and the Trocadéro Palace are other important homes of art

ground railway system (called the "Metro"), motor buses and taxicabs. The Seine, which is from 300 to 500 ft. wide along its course within the city, is spanned by over thirty bridges. All of the bridges are directly connected with quays which line the river banks; these quays are made attractive by trees, and contribute materially to the charm of the city. Six railway systems enter Paris.

Paris is a great centre for air transport. From Le Bourget, just outside the city, there are almost hourly commercial passenger lines through the air to seventeen other capitals.

Paris has a reputation for its articles of luxury, such as perfumes, gloves, artificial flowers and jewellery. These are made in small industrial establishments. The Gobelin tapestries, made in the southern part of the city, have been famous for centuries. Of increasing importance are those larger

establishments producing motor-cars, machinery, railway supplies, chemical products, soaps, dyes, leather, and other commodities.

Government. Paris is divided for government purposes into twenty *arrondissements* (districts). The head of the municipal government, called Prefect of the Seine, is appointed by the national government. Each *arrondissement* sends four elected members to a municipal council, and each has its own mayor. This official is appointed by the President. An *arrondissement* takes care of the assessment and collection of taxes

the construction of new buildings, public gardens, arches, bridges and other improvements, and he spent millions of francs in the restoration and arrangement of art and scientific collections. Napoleon III continued the work of developing the city, and to him more than anyone else Paris owes its magnificent system of boulevards. During the period of the Commune many fine buildings were destroyed, but the city was restored to its former splendour within two years. In 1878, 1889 and 1900, Paris was the home of great international exhibitions.

The city suffered a terrible siege in the Franco-German War, when the inhabitants were starved into surrender. During the World War it was the chief objective of the German invaders; in August, 1914, they were within 40 miles of the city, which was saved by the Battle of the Marne. Again, in 1918, Paris was seriously in danger of capture; repeatedly, in the spring of that year the city was bombarded by a great gun 70 miles distant. Paris was the official headquarters of the Peace Conference that met after the close of the war, though the sessions were held in the Palace of Versailles where the principal treaty was signed.

After the war, Paris was confronted with a serious housing problem, for it had to take care of a large new industrial population. The demolition of the old fortifications provided room for some buildings, and thousands of private dwellings were erected in the suburbs and outskirts of the city. In 1921 public surface transport was placed under the jurisdiction of one authority.

Modern Paris is no stranger to architectural experiment, and in recent years numerous large blocks of flats and well-planned hospitals, commercial and public buildings in the "functional" style have made their appearance.

PARIS, CONFERENCE OF. After the World War there came to Paris the leading statesmen of the countries that had fought or had broken off relations with the Central Powers. Clémenceau was appointed Chairman of the Conference. Plenary sessions were found to be unwieldy, and but few were held. A Council of Ten was formed, to be later superseded by the Council of Four. Clémenceau (France), Lloyd George (Great Britain), President Wilson (United States) and Orlando (Italy). Sir Maurice Hankey acted as Secretary. When Fiume was refused to Italy, Orlando withdrew, leaving affairs to "the Big Three." There were a large number of committees, advised by experts, to investigate various problems.

The problems were many and grave. The Allies had, with certain reservations, accepted as a basis of settlement the Fourteen



TYPICAL STATUARY IN THE LUXEMBOURG GARDENS
The Fountain of the Medici.

within its own limits, and is a local centre for educational and charitable work.

History. Julius Caesar, in his *Commentaries*, describes a small collection of huts called Lutetia, on the banks of the Seine. This obscure village, the chief settlement of the Parisii, a Gallic tribe, occupied the site of the city of to-day. As a Roman colony the settlement spread out on both sides of the river, and the present name began to be applied in the fourth century. Clovis, founder of the Frankish monarchy, made Paris his capital, and in the tenth century it became the headquarters of Hugh Capet and the seat of government of the French kingdom. During the Middle Ages the city grew steadily, and the kings up to the time of the French Revolution did much to enlarge and beautify it.

After the Revolution, Napoleon ordered

Points laid down by President Wilson early in 1918. These included open diplomacy, freedom of the seas, removal of economic barriers, general disarmament and impartial adjustment of colonial claims. Where territory was disputed, the will of the inhabitants was to be considered. Unfortunately, some of the Fourteen Points clashed with secret treaties made between various nations during the stress of war. A vocal and embittered public opinion in the Allied countries had also to be considered. The most delicate negotiations were carried on in a glare of publicity, for the Press was at times both well-informed and indiscreet.

The Conference of Paris drew up the Covenant of the League of Nations. It prepared the Treaty of Versailles (which see) and the similar Treaties of St. Germain with Austria, Trianon with Hungary and Neuilly with Bulgaria. These were signed in 1919, the Treaty of Sèvres with Turkey, signed in 1920, also strongly resembled that of Versailles.

PARIS, COUNTS OF. This title belongs to the Bourbons of the house of Orleans (which see). The present holder of the title is the son and heir of the Duke of Guise, claimant to the throne of France.

PARIS GREEN. A bright-green powder, prepared from arsenic acid and copper acetate. Paris green is valued chiefly as a wet or dry spray to kill worms, caterpillars and other insects that feed upon the foliage of plants. It is almost insoluble in water, but is usually mixed with it for wet spraying. A small amount of wet spray suitable for fruit and shade trees and shrubs would contain one-half a teaspoonful of Paris green and one teaspoonful of quicklime in a gallon of water. For potato plants, a greater amount of quicklime is needed. See INSECTICIDES AND FUNGICIDES.

PARIS, HERB. A herb and hardy perennial, whose green flowers expand in May; the flower grows on the top of the stem and is followed by a berry. The plants usually reach 6 in. *P. quadrifolia* is found in some British woods. *P. polyphylla* is rare in Britain. Natural order: *Liliaceae*.

PARIS, MATTHEW (c. 1200-1295). Paris was a monk of the great Abbey of St. Albans in Hertfordshire. His famous chronicle is known as the *Historia Major* or *Chronica Majora*, and contains the history of the Abbey down to 1235. It is of great value to the historian of the period.

PARIS, TREATIES OF. Although many pacts have been signed at Paris, this phrase is usually applied to the treaties before and after the Hundred Days Campaign. In 1814 remarkable generosity was shown to France, which had received back its old Royal House in the person of Louis XVIII. She was

therefore treated as a friendly, not as a conquered power, and was allowed practically all the territories she had held before the Revolution. By the Treaty of 1815 she was, however, to pay for her acceptance of Napoleon on his return from Elba and for the damage of his campaign. An indemnity was fixed, and an army of occupation was to enforce payment.

Other Treaties of Paris may be mentioned. In 1763 the Seven Years War was ended. Britain received from France—Canada, Eastern Louisiana, Senegal and Minorca, and from Spain Florida. France received unfortified Indian posts, Guadeloupe and Belle Isle, and Spain Cuba and the Philippines. Prussia made separate peace with Austria at Hubertsburg.

In 1778, encouraged by Burgoyne's surrender at Saratoga, France made alliance with the revolted American colonists, a step which led to war with Britain, that war was ended at Paris in 1783, when the United States were pronounced independent. France gained Tobago, Senegal and Newfoundland fishing rights, and Spain kept Minorca and Florida.

In 1856 the Crimean War was settled. Russia recognized Turkish independence. The Powers withdrew their claims to protect the Christian subjects of the Sultan, who promised milder treatment. Wallachia and Moldavia became practically independent buffer states, and Sevastopol's fortifications were destroyed. This treaty annoyed Russia, but settled little. See also VERSAILLES, TREATY OF.

PARIS, UNIVERSITY OF. One of the oldest universities of Europe. It came into prominence very early in the eleventh century, when William of Champeaux, a learned monk and teacher of theology, and his pupil Abelard began to attract attention with their lectures on theology and philosophy. About the middle of the eleventh century, provision was made for granting degrees to students who studied for a definite period.

Disagreements between the students and citizens in 1229 caused many to try other universities, but Pope Gregory IX prevailed upon the masters and pupils to return, and thereby acquired an influence over the school. The university was divided into faculties of theology, medicine, law and arts, and because the faculty of arts was the largest, its rector became *de facto* head of the university in the fourteenth century. Following quarrels with mendicant scholars who set up schools outside the jurisdiction of the university, a series of colleges for laymen were established, most notable of which was the Sorbonne, founded in 1257. Napoleon reorganized the university in 1808, and it was known as the Facultés de Paris until

1896, when Louis Liard gave it a new constitution. There are about 25,000 students, and nearly a third of them are from foreign countries.

The present organization includes the faculty of Protestant theology, the faculty of law, the medical faculty, which includes the Deputytren Museum, the faculties of science and letters, and the school of pharmacy. The associate colleges, such as the Sorbonne, have other faculties.

PARISH. The smallest unit in English local government. The term is of ecclesiastical origin. Under the Saxons the settlement was the "tun" or town, the area of which was known as the *tun-scape*, which became the township. With the spread of Christianity, Theodore of Tarsus divided the country into "parishes," so called from the Greek *paroikia*, a dwelling-place (i.e. of the priest). Generally the new parishes were co-terminous with the existing townships. In the age of feudalism, the importance of the township declined with the growth of the manor, though the ecclesiastical parish remained; but when feudalism decayed, and with it the system of English local government, the urgency of poor law legislation brought the parish again into prominence by requiring each to be responsible for the relief of its own poor. When the famous Act of 43 Elizabeth (1601) brought into being the Overseers of the Poor, the churchwardens of every parish became *ex-officio* overseers for the parish. As a unit of local government, however, the civil parish did not come into being until the Local Government Act of 1894. The civil parish and the ecclesiastical parish then became distinct, the ecclesiastical parish now being governed by the Church of England Assembly (Powers) Act, 1919, which provided for Parochial Church Meetings, Parochial Church Councils, and a National Assembly of the Church of England.

The Local Government Parish. The Local Government Act, 1894, divided the whole of England and Wales into parishes, either urban or rural, the parish being defined as "a place for which a separate poor rate is or can be made, or for which a separate overseer is or can be appointed." The Rating and Valuation Act, 1925, finally abolished the rating functions of the parishes.

RURAL PARISHES are still self-governing in certain respects. They have their own Parish Meetings, and where the population is over 300 they elect a Parish Council, which is a corporate body with perpetual succession but no common seal. A Parish Meeting may elect a Parish Council where the population is less than 300, but if it is less than a hundred permission must be obtained from the County Council.

Both the Parish Meeting and the Parish Council appoint two representatives to the rating committee of the rural district council. The Parish authority cannot directly levy a rate, but the Parish Meeting can spend the equivalent of an eightpenny rate-inclusive of the Adoptive Acts (see under LOCAL GOVERNMENT); the Parish Council can spend fourpence in the pound of the rateable value, *exclusive* of the Adoptive Acts, or eightpence with the approval of the Parish Meeting. The Parish Council may be a minor Education Authority and appoint school managers. It may also provide small holdings and allotments, maintain footpaths and rights of way, and may veto the stopping and diversion of highways.

PARK, MUNGO (1771-1806). Park, a Lowland Scot, became assistant surgeon to an East Indianman.

In 1794 he was sent out by the African Association to explore the Niger. His lonely venture lasted over two years, during which he suffered a spell of captivity and on several occasions saved his life only by his courage and quick wit. He described his adventures in his *Travels in the Interior of Africa*, which makes admirable reading. He settled as a doctor in Scotland, but in 1805 he set out to Africa again on a similar quest. This time he commanded an expedition containing over forty Europeans, but their numbers were rapidly thinned by illness. According to the tale told later by his native guide, the few remaining members of the party were sailing down the Niger in a large boat when it grounded on a rock, and they were drowned in attempting to escape from hostile natives.

PARKER, SIR GILBERT (1862-1932). A Canadian novelist and statesman. He was an ardent believer in the closer union of



MUNGO PARK
(National Portrait Gallery)



SIR GILBERT PARKER
Photo: Brown Bros

the English colonies, advocating and supporting any project aimed at giving Imperial preference. In 1902 he was knighted by King Edward VII, in 1915 was created a baronet, and in 1916 was made a privy councillor by King George V. During the first two years of the World War, Sir Gilbert had general charge of British publicity in the United States. He was the author of a large number of novels dealing with French-Canadian life.

PARKS. The "open spaces" of the towns; usually the property of the municipality or

Among other London parks St. James' Park and Regent's Park are each of them unique. The Royal Park of Richmond is, in the main, a former hunting ground, still unspoilt, and dating back to the time of Charles II.

National Parks. In the country at large—not to mention the parks of provincial cities, many of which are of the highest merit—of most general interest are the areas which have been, or are intended to be set aside as National Parks, e.g. the Peak Dis-



VIEW IN SHENANDOAH NATIONAL PARK, U.S.A.
The Shenandoah River is in the middle distance.

Photo: Staley



AUSTRALIAN NATIONAL PARK
Moran's Creek, Lamington Plateau, Queensland.

Photo. Australian Trade Publicity

other powerful body, or (in the London area) of the Crown, being sometimes survivals of the common lands of the Middle Ages, preserved from the encroachment of bricks and mortar and dedicated to the public enjoyment. Of English parks perhaps Hyde Park is the best known, and in fact, from its associations with English royalty, its pageant of Society taking the air on horseback, and from the part it has played in the history of the metropolis and of England as the scene of various historic gatherings, is in one sense the hub of the Empire. To the charm of its many monuments and the beauty of its large lake, the Serpentine, it adds the peculiar distinction of being probably the only open space in the heart of a modern capital where sheep may be seen grazing as if in their native fields.

tract of Derbyshire, Snowdonia and the Lake District. These have opened up in perpetuity for the people's recreation some of the finest scenery to be found in Britain.

The National Parks of Canada and the United States are of course on a far more spacious scale, some of them being of unparalleled grandeur. The Jasper Park of Canada, comprising 4200 sq. miles of rugged mountain scenery, is the largest National Park in America, while the Banff National Park (2585 sq. miles) embraces a beautiful pleasure-resort region of the Rocky Mountains. See CANADA.

Of National Parks in the U.S.A., some of the best known are the Yellowstone (3426 sq. miles), having canyons, geysers and mud volcanoes; the Sequoia, containing many huge living conifers over 2000 years old;



JASPER NATIONAL PARK, ALBERTA

Photo: Canadian National Railway

the Grand Canyon (see COLORADO); and the Crater Lake National Park in the Cascade Mountains of Oregon, an impressive beauty spot.

PARLEMENT, *par' lè mōN*. Name applied in France, down to the Revolution, to certain final courts for the administration of justice, in which the edicts of kings also were registered before they became laws. Their historical importance lies in their influence upon later judiciary tribunals in France and throughout the world. They did much to summarize and unify the common law, and in dispensing justice were notably free from prejudice and party influence. Although there were at least twelve provincial parlements in leading cities, the most important was the Parlement of Paris, which dated from the fourteenth century.

Although they were not directly connected with that of Paris, the provincial parlements made common cause with it in its struggles with the royal power. The functions of the parlements were chiefly judicial, although they had wide political and administrative power. They were especially influential in the reigns of Louis XI and Louis XIV. Louis XV abolished the Parlement of Paris, and constituted a new and somewhat differ-

ent body, but the former counsellors were recalled by Louis XVI. The Parlement of Paris and all the local parlements were abolished by the National Assembly in 1790; for although these bodies had been in the years before the Revolution ardent advocates of reform, they were as unwilling as the nobles and the clergy to give up any of their time-honoured privileges. See FRANCE (History).

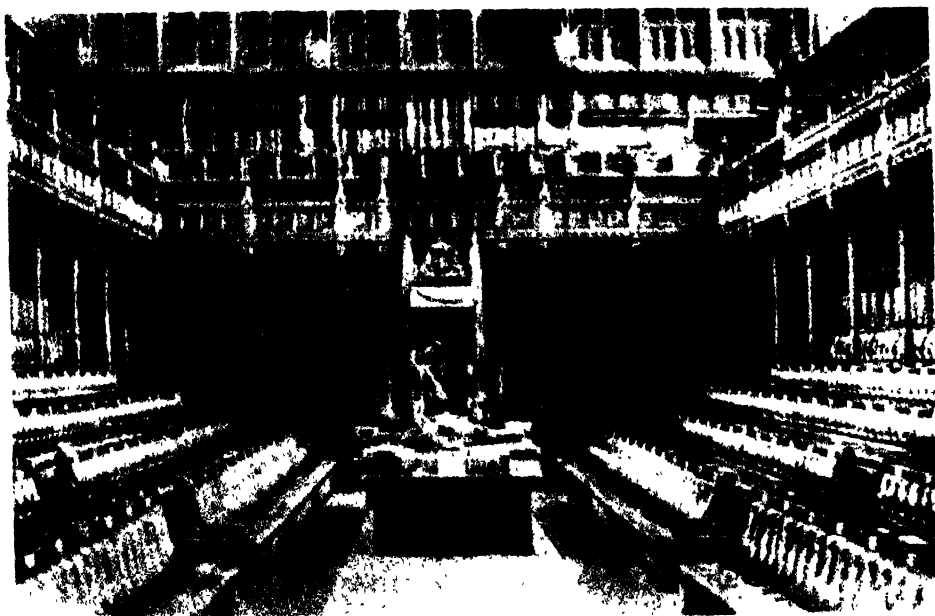
PARLIAMENT. A term denoting, in general, any deliberative assembly; but specifically, the supreme legislative body of the United Kingdom of Great Britain and Northern Ireland. This term is also applied to the Federal legislative bodies of Canada, the Union of South Africa, and the Commonwealth of Australia. Among all peoples in an early state of society there was always a tribal council that advised the local chief; when the tribes united to form a confederacy, there was always a council representing it to advise the King. This was true of the confederated tribes of the Anglo-Saxons that overran England. The modern Parliament of the United Kingdom is the development of these primitive councils.

In early times there were three divisions

of the law-making power in England—the King, the *Lords*, and the *Commons*. In the long course of transition to the present Parliament there occurred a complete reversal of the relative power and importance of these constituent parts. Formerly, the King was the source of legislation; he was advised, however, by his lords. Only by slow degrees were the common people, by means of their representatives, admitted to a place in the councils of State. The first assembly comparable to the modern Parliament met in 1265. Not until the reign of Edward III was Parliament formally divided into two houses, the House of Commons and the House of Lords. Then began a long struggle, which was ended by the House of Commons becoming the most important law-making power in Great Britain; the modern House of Lords has been shorn of much of its ancient prestige, while the Sovereign cannot override the will of Parliament. This result followed the passage of the Bill of Rights in 1689. In fact, William of Orange was allowed to ascend the throne only on the understanding that Parliament should be supreme. George I, with his ignorance of the English language, played further into the hands of Parliament. George III tried to obtain control by "packing" Parliament with his supporters, but the exercise of his

acquired power brought disaster to his hopes; the loss of the American colonies was a tremendous blow to his prestige, and Parliament regained its supremacy. Later the extension of the franchise by the Reform Act of 1832 assured the rule of democracy. The saying has become proverbial, "The King reigns, but does not rule." Though he has the constitutional right to be present in the House of Lords—not, however, taking part in the debates—in practice this right is not exercised.

The House of Commons. This body, as now constituted, consists of 615 members—492 from England, 36 from Wales, 74 from Scotland, and 13 from Northern Ireland. It is the real governing body of the nation, and, owing to the extension of male and female suffrage to all of twenty-one years and over, it is truly representative of the common people. It has full control of all financial legislation—the House of Lords, by the Parliament Act, 1911, having lost the power of amending any financial measure sent up to it by the House of Commons, although it formerly had the right of rejection. The House of Commons shapes the policies of the nation because of its control over the Cabinet Ministers. Before the reign of Queen Anne (1702-1714) the Ministers were in name, and in fact, the servants of the

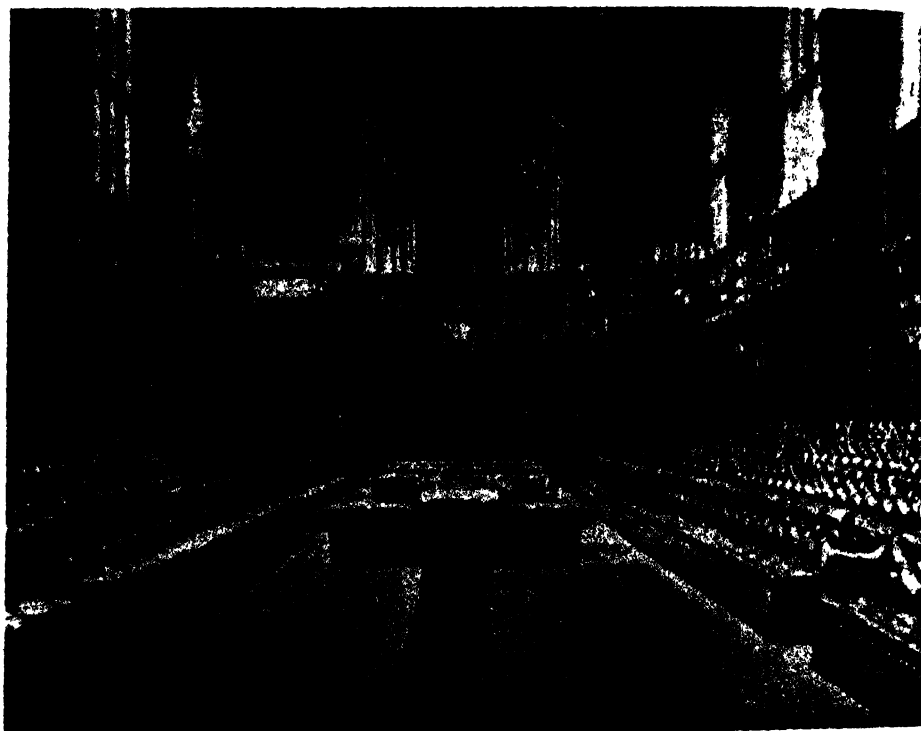


HOUSE OF COMMONS
The Speaker's Chair is in the background.
Visual Education Service

sovereign; but since then they have been the servants of the House of Commons. As such, they must resign when they lose the support of the Commons, such loss being evidenced by the defeat of any important measure they support. See CABINET.

The House of Commons is an elected body; about half the members represent counties, a large number represent boroughs, and eleven represent universities. Those eligible

if defeated for election in one place, he may try for election elsewhere. If elected, he represents his division for the life of the Parliament to which he is elected, which is five years, unless it is dissolved before that time. Parliament usually sits from November to August; members formerly served without pay, but since 1911 they have received a salary of £400 each, unless already in receipt of a salary from Government



HOUSE OF LORDS

While there is no evidence that the Lords and Commons ever voted as a single assembly, it is known that, in early times, their deliberations were separate and conducted in different parts of a single chamber. Eventually, when discussions lengthened, it was found convenient to separate the two houses. This is believed to have taken place in the reign of Edward III.

Photo: Topical

to vote for members representing the universities are their graduates. A candidate for Parliament must be a British subject, over twenty-one years of age, who suffers no legal disqualification, e.g. undischarged from bankruptcy, or having served a term of penal servitude. Since 1919 women have been eligible.

There is this peculiarity about the English elective system: a candidate does not have to be a resident of the district he seeks to represent. He may live in one parliamentary division and be elected to represent another;

office, e.g. the Ministers and Parliamentary Secretaries. Since 1924 they have been provided with vouchers allowing free first-class rail travel between London and their constituencies. A member, once elected, cannot resign. He must apply for the Stewardship of the Chiltern Hundreds, which is theoretically an office of profit under the Crown. As a holder of such office, he cannot sit in Parliament without re-election. The Commons are presided over by the Speaker, who controls debates. He is elected by the House itself and is paid an

annual salary of £5000 and provided with an official residence near the House.

The House of Lords. This is the Upper House of the English Parliament, composed of the spiritual lords of England (the two archbishops and twenty-four of the bishops) and the temporal peers of the United Kingdom, together with representative peers of Scotland and Ireland. All peers of the United Kingdom are entitled to seats in the House of Lords, and therefore their number tends to increase, but of the Scottish and Irish peers only a small number are chosen by their fellow-peers to represent them in Parliament. There are sixteen Scottish and twenty-eight Irish representative peers, each elected for life, but, owing to the secession of the Irish Free State, no more Irish peers are being elected when vacancies occur, until further notice. There are also seven Lords of Appeal, who embody the appellate jurisdiction of the House of Lords. Irish peers who do not sit in the House of Lords can represent any constituency in the Commons, but a Scottish peer has no similar right. See **PEERAGE**.

Formerly, the House of Lords was the more important of the two Houses; it existed, in fact, before the House of Commons, but its importance gradually waned as the Commons steadily increased in power and influence. The Lords have now lost the power to defeat the will of the people as expressed in legislative enactments of the Commons, though they can delay the application of legislation for two years. In accordance with the Parliament Act of 1911, a bill passed by the House of Commons in each of three successive sessions of Parliament, although rejected by the House of Lords, becomes a law without the sanction of that chamber. This loss of power was not accepted by the Lords without a protest, and they did not yield until faced with the threat that enough Liberal peers to place the opposition in the minority would be created. It is the King's right to create any number of new peers on the recommendation of his Ministers.

At the opening of each Parliamentary Session, the King attends in state and delivers the King's Speech from the Throne in the House of Lords. Here again, the King has lost his ruling prerogative, as his "Speech" is prepared by the Cabinet and outlines proposed legislation. This is followed by a debate in the Commons on the policy declared, and the reply of the House to the Speech is presented in the form of an Address which is conveyed to the King. The Opposition seeks to move an amendment to the Address.

Parliament Buildings. Parliament meets at Westminster, London, in the Houses of

Parliament, erected on the north side of the Thames at Westminster Bridge. Here stood the ancient Palace of Westminster, a royal residence built by Edward the Confessor, which was destroyed by fire in 1834. Rebuilding started in 1840, the new House of Lords being used in 1847 and the House of Commons in 1852. The lower House is surmounted by the clock tower of Big Ben, named after the Commissioner of Works in 1856—Sir Benjamin Hall. When Parliament is sitting, a light is shown above the clock face. The House of Lords is marked by the Victoria Tower, on which the Union Jack is hoisted when Parliament is in session.

Parliaments in British Dominions. Six of the self-governing British units—Canada, Australia, New Zealand, Newfoundland, South Africa, and the Irish Free State—have legislative bodies whose powers and organization correspond to those of the British Parliament. The Upper House is called the Senate in Canada, Australia, and South Africa, and Legislative Council in New Zealand and Newfoundland. The Lower House is called the House of Commons in Canada, the House of Representatives in Australia and New Zealand, and House of Assembly in South Africa and Newfoundland. In the Irish Free State the lower house is the Chamber of Deputies (*Dail Eireann*), the upper house, the Senate (*Seanad Eireann*), has been abolished. For further details, see the section on *Government* in the articles in these volumes on AUSTRALIA; CANADA, NEW ZEALAND, SOUTH AFRICA, UNION OF; IRISH FREE STATE, also DAIL EIREANN.

PARLIAMENTARY LAW. A general term for the law relating to the constitution, election, procedure and powers of Parliament, and to the privileges of its members. While some of this law is enacted in statutes, the greater part of it is to be found in ancient custom, sometimes embodied in the common law. Parliament consists of the King, the Lords and the Commons. (See **PARLIAMENT**.) The right to vote at elections is regulated by a number of Representation of the People Acts, which virtually extend the franchise to all adults. The qualifications are either business or residential, though not more than two votes are permitted to each voter. A register of voters is prepared every year in each electoral district. The House of Commons is elected for five years. It may, however, by an Act prolong its own life, and conversely, a dissolution of Parliament by the King can put a complete end to the House of Commons at any time before the expiration of five years. Disputed elections are now tried in the High Court, by procedure known as an election petition.

Parliament is opened by the King, and thereupon the Commons retire to elect their Speaker. The Adjournment of Parliament is the continuance of a session from day to day. Prorogation by the King puts an end to the Session, but, unlike dissolution, does not put an end to the Parliament. Every Bill, to become an Act, must be passed by the Commons and normally by the Lords, and must then receive the Royal assent, which in practice is not now refused. Since the Parliament Act of 1911, the power of the Lords is entirely restricted in the case of money Bills, while in the case of any Bill their power is limited in effect to delaying the passage into law for some two years, if they refuse to pass it through their House. See ACT OF PARLIAMENT.

It has been recognized for centuries that members of both Houses possess privileges; it is also recognized that, within the limits of the privilege, the House is the sole judge of matters relating to that privilege. The Courts will, however, determine whether the privilege claimed actually exists, and if so, will not adjudicate. But the Courts, in deciding the question, will not accept the statement of one House as to the existence of privilege. The most important privilege is that of freedom of speech, which is absolute, though, of course, the Speaker can exercise his disciplinary power in the event of "unparliamentary" conduct. Freedom from arrest is no longer of practical importance. It does not extend to arrest for an indictable offence or contempt of court, and is limited to forty days before and after actual sitting of the House. The above privileges apply likewise to the House of Lords, which has the additional important privilege, resigned by the Commons to the Courts, of determining all questions relating to its own composition, in particular the determination of disputed peerage claims.

PARMA. See ITALY.

PARMENIDES, *par men' id eez*. Greek philosopher of the fifth century B.C.; born at Elea in southern Italy, and the successor in thought of Heracleitus. Of his life almost nothing is known, and he left only one disciple, Zeno. It is almost certain that he knew that the earth was of spherical shape. This fact profoundly influenced him, as is clear if one bears in mind that at that stage of Greek philosophy the dividing line between physical and metaphysical speculation does not exist. From the perfect sphere of the earth derives his other main doctrine, that being is something without movement, variety or change, without beginning and without end, thus opposing radically the Pythagorean view that reality is something composed of antitheses, one

and many, light and darkness, rest and motion. In his attitude to reason, he also differs from his predecessors. Heracleitus had taught that the "reasonable principle" was a fiery particle, acting in harmony by virtue of its common nature with the fire or energy by which the universe is directed. To Parmenides, mind and object are actually the same; reason merely reflects external uniformity, and is logically identical with it. In this sense he may be said to have founded the materialistic basis of Greek philosophy, which later was to rest to a great extent on the doctrine of the eternity of matter.

PARMOOR, CHARLES ALFRED CRIPP, 1ST BARON (born 1852). Called to the Bar in 1877, he became a great authority on ecclesiastical law. He was returned to Parliament as a Conservative in 1895. In 1914 he became a peer. His hatred of war has been shown by his pacifist labours, and has resulted in political re-orientation, for in 1924 and in 1929 he was Lord President of the Council in the Labour Governments.

PARNASSUS, *par nas' us*. A mountain intimately connected with the worship of the gods of the ancient Greeks. Situated in Phocis, its twin peaks reach a height of over 8000 ft., and except in the hottest months, snow crowns the summit. It was looked upon in ancient times as the special haunt of Apollo, the Muses, Dionysus and Pan. The Bacchantes held their orgies annually on one of the two peaks, and in the groves at all times sounded the pipes of Pan. There were two especially holy places. One enclosed the fountain of Castalia, a spring which still bubbles out of the cleft between the two great peaks. The other was the temple of the Delphic oracle of Apollo. The modern name of the mountain is Liki or Lyakoura.

PARNELL, CHARLES STEWART (1847-1891). An Irish statesman who was one of the foremost figures in the Irish opposition to English rule. He was born at Avondale, Wicklow. In 1875 he entered Parliament for Meath as an Irish Nationalist, and had soon attained a commanding position. His programme from the first included a National Parliament and Home Rule for Ireland.

Parnell was an able Parliamentarian. His Home Rule party was well disciplined, and would always vote against the Government and obstruct business by speeches of heroic length. Parnell hated, and strove to check, outrages. In 1882 he publicly denounced the murder of Lord Frederick Cavendish, the Irish Secretary, for this action did his cause a great deal of harm.

In the interests of the Land League, whose object was to improve the condition of the

poor tenants, Parnell visited America in 1879 and collected a large popular subscription. After 1880 he was the formal as well as the actual head of the Irish party in Parliament, and his agitation on the land question was so persistent that in 1881 he was arrested and imprisoned for six months. When Gladstone became head of the Ministry in 1886, with a Home Rule policy, Parnell supported him, but the party was speedily defeated and went out of office. In the next year, Parnell and his associates were accused by *The Times* of conspiracy against the Government, and facsimile letters were published to prove their guilt. Parnell protested in Parliament that the letters were forgeries, and the finding by a commission that such was indeed the case made Parnell more powerful than he had ever been before.

Meanwhile, rumours had become current connecting Parnell's name with that of Mrs. O'Shea, the wife of one of his supporters, and in 1889 Captain O'Shea began divorce proceedings, naming Parnell as co-respondent. No defence was offered, the divorce was granted, and Parnell and Mrs. O'Shea were married, but Parnell's reputation and influence were so shattered that he was deposed from the leadership of the Irish party. See HOME RULE; IRELAND.

PARODY. A comic imitation of any serious writing. The subject need not be the same, indeed, should not, but the manner and form must suggest the original work. Parodies of verse are more common than those on prose, probably because parody is apt to grow tiresome if it runs beyond a certain length. Max Beerbohm's brief parodies of prose writers in *A Christmas Garland* are extremely effective, and the work of Sir Owen Seaman and Sir John Squire in both prose and verse is noteworthy.

Parody is very old, for the first known example, the *Battle of the Frogs and Mice*, dates from at least the fifth century B.C. The *Acharnians* of Aristophanes was a parody of Euripides; *Don Quixote* was a parody of the exaggerated romances of chivalry; and the nineteenth century was particularly rich in such burlesques. It has occasionally happened that a writer, setting out with the intention of parodying another, has ended by writing quite seriously. Fielding, for instance, began his *Joseph Andrews* with the idea of laughing at Richardson's *Pamela*, but before long he had become too interested in his characters to continue the burlesque. There are many famous parodies in English literature, the most celebrated of all perhaps being the *Rejected Addresses* of Horace and James Smith (1812), in which the style of Wordsworth, Coleridge, Crabbe, Scott and other

contemporary poets was amusingly imitated. Burlesque plays like *The Rehearsal*, *Tom Thumb*, and *The Critic* necessarily contain an element of parody; and in its highest form, parody becomes an amusing species of literary criticism.

PAROLE, pa rôl'. A prisoner of war is said to be liberated *on parole* when he is allowed his freedom on giving his word of honour not to take part in the war against his captors. According to the laws and usages of war as now recognized by international law, the parole should be in writing, signed by the prisoner, and should state clearly its conditions. A prisoner, liberated on parole, who breaks his word and is recaptured, cannot then claim to be treated as a prisoner of war, but may be shot.

PAROTID, GLANDS. The largest of the salivary glands. See SALIVA.

PARQUET, par' kay. A type of flooring. Thin boarding, cut into geometrically shaped pieces, is laid over other floor boards, sometimes blocks of wood are used. The parquet can be of any design. Hard woods that are capable of being highly polished are generally used, a favourite with builders being Austrian oak as it has uniformity in colour and is little marked.

PARR. An immature salmon or sea trout, at the stage intermediate between the fry



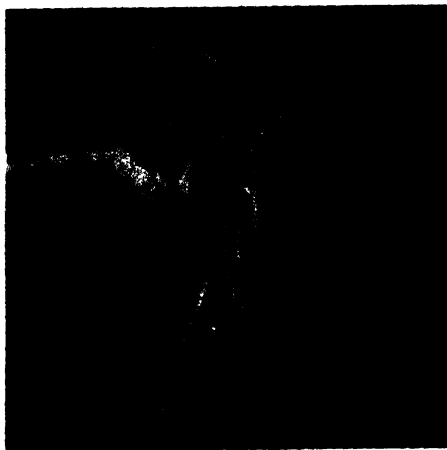
PARR
Photo: Wellen

and smolt stages of growth. A parr may be one, two, or three years old.

PARR, CATHERINE. Sixth wife of Henry VIII. See HENRY VIII.

PARRAKEET. Several members of the parrot family, which are distinguished by their small size and their long, graduated tails. Parrakeets are found in the tropical regions of the Old and New Worlds. The best-known Indian species is the *ring-necked parrakeet*, which is about 16 in. in length, 10 in. being the measure of the tail. A kind of parrakeet that sleeps hanging to the branch of a tree is called the *bat parrot*. A small Australian grass parakeet is commonly known as the Budgerigar (which see).

The ground parrakeet of Australia and



PARRAKEET

Photo Visual Education Service

Tasmania lives among thickets, rather than in trees.

Scientific Name. Parakeets belong to the parrot order, *Psittacidae*.

PARRHASIUS, *pá ray' shius*. A Greek painter who lived in the time of Socrates (about 400 B.C.) He was born at Ephesus, but became a citizen of Athens. The character of his work is known only from the criticism of ancient writers, as none of his paintings has survived. Pliny states that he was the first artist who made the proportions of his pictures correct, and that he excelled in drawing the outlines of objects. He is said to have been the first who knew how to give the effect of solidity by the use of light and shade. Most of his paintings were on mythological subjects; his picture of Theseus was placed in the Capitol at Rome.

PARROT. Because it can be taught to speak words and phrases by imitating the sounds it hears, the parrot is a popular cage bird. Brilliant plumage, a stout, hooked bill, a fleshy tongue, and feet adapted to climbing are other familiar characteristics of the bird. The order contains about 625 species, distributed throughout all tropical countries, but most abundantly in Central and South America, Australia and the Pacific islands. Parrots are sociable birds, usually living in colonies. Their voices are loud and harsh. They eat a variety of food, including seeds, nuts, insects, nectar, and, in some cases, carrion. Most species nest in holes in trees, but deposit their eggs in banks of earth. Two or three white eggs are laid. The average length of life of the parrot is 54 years.

In New Zealand are found the *brown parrot*,

also called the *kaka parrot*, in imitation of its voice; the *kea* or *mountain parrot*, a large species, infamous for its sheep-killing habits; and the *owl parrot*, a species whose name refers to the hair-like feathers about its eyes, and which is nocturnal and flightless. In the Australian region are found the *cockatoos*, very large birds, usually white in colour, tinged with rose or sulphur-yellow, and having large frontal crests; and the *lories* and *lorikeets*, small, handsome birds with pointed wings and rounded tails. African parrots are small, usually less than 12 in. in length. The best-known African species is the *grey parrot*, one of the cleverest talking birds. *Pigmy parrots*, from 3 to 5 in. long, are found in the Papuan Islands. Among American parrots the *macaw* is well known. The true *parrakeets* form a numerous group, of wide distribution. See **PARRAKEET**, **LORE**.

The Cuban parrot is about 10 in. long, and has a green body, white forehead, scarlet throat, and brilliant wings and tail feathers, which display a mingling of blue, green, and scarlet.

Psittacosis, *sit a kó'sis*, or **PARROT FEVER**. A disease contracted by human beings in close contact with parrots. Victims show symptoms of pneumonia and develop a high fever, cases frequently prove fatal. Certain types of parrot are carriers of the germ which causes the malady, and imported



AFRICAN GREY PARROT

parrots are now examined before admission for signs of infection.

Scientific Name. Naturalists are not agreed as to the detailed classification of parrots, but these birds, by general agreement are placed in the sub-order *Psittaci* of the order *Psittaciformes*.

PARRY, SIR CHARLES HUBERT HASTINGS (1848-1918). English composer and writer on music. Together with Stanford and Elgar, Parry restored the art of oratorio to a renewed level of importance in England, although of the three, perhaps Elgar has alone achieved lasting fame. Parry also wrote much orchestral, chamber, and piano music. He contributed considerable sections to Grove's *Dictionary of Music*, and to the *Oxford History of Music*, and is the author of *The Evolution of the Art of Music*. He was appointed Director of the Royal College of Music in 1894, knighted in 1898, made Professor of Music at Oxford in 1900, and a baronet in 1903.

PARRY, SIR WILLIAM EDWARD (1790-1855). A British Arctic explorer and naval officer who did valuable pioneer work in Polar exploration. Born at Bath, he entered the Navy as a midshipman in 1806. His career as an Arctic explorer began in 1811 when he was made a lieutenant in the frigate *Alexandria*. Subsequently, he made three expeditions in search of the North-West Passage. In 1827 Parry sailed on the *Hecla* in an attempt to reach the North Pole by the Spitsbergen route. Leaving his ship in Truenerberg Bay, he started for the far north with two boats, twenty-eight men, and supplies for about seventy days. In the hazardous journey across the ice, he reached a point in latitude 82° 45', the highest north until then attained. Parry described his experiences on his Polar journeys in two books, *Voyages for the North-West Passage* and *Narrative of an Attempt to Reach the North Pole in Boats*.

PARSEC, par'sek. See ASTRONOMY (Light-Years).

PARSEES, par sees'. A religious sect of India which takes its name from Pars, or Fars, the province in Persia where it was founded. The Parsees are the modern followers of Zoroaster (see ZOROASTER; ZEND-AVESTA). The invasion of the Mohammedans in the seventh century drove the greater number to the western coast of India, where they have advanced and prospered, but their worship has accommodated itself to Hindu ideas and practices. Bombay is their headquarters. The small number that remained in Persia was subjected to persecution and sank into poverty. They preserved their religion intact, however, and to-day they are respected by Europeans for their honesty and integrity.

The Parsees do not marry persons not of their caste or creed, nor do they eat anything prepared by one of another religion. Their dead are exposed on "Towers of Silence" to be consumed by vultures.

PARSING. In English grammar, stating the part of speech to which a particular word belongs, and explaining how it is used in the sentence.

The information which is required when parsing each of the parts of speech is given below—

Noun: State classification, person, number, and case, and its syntax or use in the sentence.

Pronoun: State classification, its antecedent, expressed or understood, its person, number, gender and case, and its use in the sentence.

Adjective: State classification, degree of comparison (if any), and its use in the sentence.

Adverb: State classification, degree of comparison (if any), and its use in the sentence.

Verb: State classification, regular or irregular, transitive or intransitive, its voice, if transitive; its object, if it is in the active voice, its mood, tense, person and number, and the subject with which it agrees.

Preposition: Name the noun or noun equivalent which it governs.

Conjunction: State what elements of a given sentence it connects, and thus determine whether it is co-ordinating or subordinating.

Interjection: It is only necessary to point out interjections, because they have no grammatical relation to the rest of the sentence.

PARSLEY. A biennial garden herb cultivated chiefly for its leaves, which are used as a seasoning. If permitted to grow to



PARSLEY
Photo. Carters

maturity, the plant will reach a height of 3 ft. and bear small, greenish-yellow flowers. Most cultivated varieties do not develop the flower stalk until the second year. Several kinds of parsley are grown, the favourite variety being that with curled leaves. The seed is slow in germinating.

This herb was well known to the ancients. In the stories of Hercules, its leaves are mentioned as forming one of his garlands of victory, and the Greeks used parsley wreaths both on festive occasions and at their funerals.

Scientific Name. Parsley is the characteristic plant of the family *Umbelliferae* (which see). The botanical name of garden parsley is *Carum petroselinum*.

PARSNIP. A nourishing vegetable of the parsley family, native to Europe and Asia. The edible portion is the long white tapering root, which has a sweetish flavour. Parsnips thrive in soil that is deeply dug and has been well manured in the previous year.



PARSNIP
Photo Carliers

The parsnip is one of the best of winter vegetables, and the flavour of the roots is improved, rather than injured, by frost. They should be lifted in November. Parsnips have about the same nutritive qualities as carrots. They are best cooked uncut.

Scientific Name. The parsnip belongs to the family *Umbelliferae* (which see). Its botanical name is *Pseudanum sativum*.

PARSONS, SIR CHARLES ALGERNON (1854-1931). An English engineer, famous as the inventor of the steam turbine. See **TURBINE**.

PARTHENOGENESIS. A term meaning "virgin reproduction." The females of many of the lower forms of animal life and certain flowering plants are capable of producing young without the aid of the male. A characteristic example is to be found among the Aphides. During the summer months there are only female greenfly to be found, and they produce successive generations of females. But later in the year males generally appear, and normal reproduction takes place, with the production of eggs which remain dormant over the cold winter months.

PARTHENON. The most celebrated of the temples of ancient Greece still surviving in part. It stands on the Acropolis at Athens, and was dedicated to Athene. The building was about 228 ft. in length, 101 ft. in width, and 65 ft. in height. The massive Doric columns are 34 ft. high, and there were in the original plan eight at each end and seventeen at the sides. One of the most beautiful features of the temple was the frieze, wrought in low relief and extending entirely around the outer wall of the cella and within the surrounding columns, it depicted the great Panathenaic procession, in which all classes of Athenians assembled to do honour to the Goddess. Other parts were ornamented with gigantic sculptured figures. The building was constructed of white Pentelic marble, and the tiles of the roof of Parian marble. Within there were two halls, one of which contained the great ivory and gold statue of Athene by Phidias, who superin-

tended the building of the temple. The architects were Ictinus and Callicrates.

The building of the Parthenon dates from 447 B.C. It served its original purpose until about the sixth century, and then became a Christian church dedicated to the Divine Wisdom, and later to the Virgin. Later, when Athens was captured by the Turks in 1458, it was a Mohammedan mosque. When the Venetians were striving to conquer Athens in 1687, the Parthenon was used as a powder house by the Turks, and suffered much from an explosion which killed 300 people and completely destroyed the central portion of the building. Many of the sculptures were afterward taken to London by Lord Elgin and are now in the British Museum as the "Elgin Marbles."

In 1830 the newly founded Greek monarchy interested itself in clearing away the debris and excavating the fallen sculptures. These sculptures were subsequently placed in the Acropolis Museum, erected for the purpose, which has proved a treasure-house for students of Greek art. In 1929 a plan to raise the fallen columns to their original places and make such other repairs as were needed was put into execution.

PARTHIA. An ancient empire of Central Asia, to the south east of the Caspian Sea. The Parthians were of Turanian stock, of the same race as the Huns and Bulgarians, peoples of the ancient world. They lived a nomad life, being indifferent to commerce and agriculture. They were remarkable for their bravery, and were famed for their method of fighting on horseback, armed only with bows and arrows. The training began during boyhood, and such skill was attained that the warrior could use his weapon with ease and effectiveness whether his horse was stationary or at a gallop, advancing or retreating. Since his object was to keep constantly in motion before the enemy, he would ride away as if in retreat, after he had discharged an arrow, in order to gain time to adjust another arrow to the bow, whence the saying "A Parthian shot."

The Parthians maintained their independence from the time of their settlement until late in the sixth century B.C., when Cyrus, the great Persian conqueror, conquered the country, and it was organized into a satrapy, or principality, under Darius. Alexander the Great included Parthia in his conquests, and following his death, the country became a part of the kingdom of Syria, founded by Seleucus. About 250 B.C. the people revolted and formed a separate kingdom under Arsaces, who founded a dynasty of tyrannical rulers. Subsequent conquests extended the dominion to the

Euphrates and Indus, and made Parthia a powerful and flourishing empire with the capital at Hecatompylos.

The Parthians successfully resisted the Romans, who repeatedly invaded their territory, and the Battle of Nisibis, A.D. 117, the final conflict of Rome and Parthia, was the fiercest of the struggles. Later, internal dissension and corruption so undermined the Parthian monarchy that in A.D. 226 it was overthrown by a revolt of the Persians; the dynasty of Arsaces gave place to the new Persian Empire, the Sassanian monarchy founded by Artaxerxes Bebagau.

PARTICIPLE. The word is derived from the Latin for *partake*. In English grammar the participle is a form of the verb which "partakes" of the nature of an adjective, Examples. *Running* water, We came to a stream *running* down the valley; A *broken* jug. That is the jug *broken* by your carelessness. While being partly an adjective, a participle retains its verbal character in that it may have an object and be qualified by an adverb. Participles are also used in certain compound verb-forms. The present participle, which always ends in *-ing*, is used with the auxiliary "to be" to form the continuous (or imperfect) tenses; e.g. I am *walking*. The past participle is used in perfect tenses (e.g. I have *laughed*), and in the passive voice (e.g. I am *forsoaken*).

PARTNERSHIP. Ordinary partnerships in the United Kingdom are governed by the Partnership Act, 1890, which defines a partnership as "the relation subsisting between persons carrying on a business in common with a view of profit." A partnership must consist of not more than ten persons for a banking business, and of not more than twenty persons for any other business. Any body of persons exceeding those numbers must be registered as a company under the Companies Act. The Partnership Act, 1890, contains provisions that apply to partnerships where there is no agreement between the partners, and it also contains the general law of partnerships, which cannot be contracted out of by any agreement. The most usual method of creating a partnership is by a deed termed **Articles of Partnership**. Exactly what these Articles should contain must, of course, be decided by the parties concerned, and the terms necessarily vary with the nature of the business intended to be carried on. Some of the principal matters for inclusion may be noted. First will come the firm name (see **BUSINESS NAME**), and names of the partners, with particulars of capital brought into the partnership by each of them. Next will be specified the term for which the partnership is to continue, the place of

business, the tenancy on which the premises are to be held, the sharing of the profits and losses by the partners, and the amount of time and attention to be given by each to the business of the firm. Various stipulations as to the policy to be adopted by the firm with regard to giving credit will be laid down, and due provision made for the keeping of proper books of account. In order to avoid bringing partnership affairs into Court, many deeds conclude with a clause agreeing that any dispute between partners shall be referred to arbitration. The Articles of Partnership having been signed and sealed by all the parties, and properly stamped, the partnership begins forthwith.

The Partnership Act, 1890, lays down the rules implied where the points are not covered by Articles of Partnership. For instance, failing agreement to the contrary, the partners are entitled to share equally in the capital and profits, and must contribute equally to the losses. The same Act also points out who are and who are not partners. For instance, the receipt by any person of a share in the profits of any concern is not conclusive evidence that he is a partner; on the other hand, a man may so interfere with the partnership affairs as to become liable, in the same manner as if he were in fact a partner, to any person who may, on the faith of such evidence, have dealings with the partnership.

Each partner is liable for the debts contracted by the partnership after he becomes a member of it, though he is not liable for debts already in existence, nor for those contracted after he has given up the partnership, if he has given public notice of his retirement.

In the absence of any provision in the Articles of Partnership, or of any other agreement, a partnership is dissolved by death, bankruptcy or insanity of a partner, by the business becoming unlawful owing to a change in the law of the land, and for other reasons specified in the Act. There are important provisions applying to the distribution of assets at the termination of the partnership, in the absence of agreement otherwise. Debts and losses of the firm must be paid first out of profits, if sufficient, otherwise, out of capital. Then, failing complete settlement, the partners themselves must contribute in the proportion in which they were entitled to share the profits.

Limited Partnerships. One of the principal rules of the general law of partnership is that every partner is fully liable for the debts and liabilities of the firm. By an Act passed by the British Parliament in 1907, and known as the Limited Partnership Act, a special

kind of partnership was allowed in which a certain class of partner could escape the heavy responsibility, while still enabled to share in the partnership profits. A limited partnership is a partnership that consists of one or more general partners and one or more limited partners. The liability of the latter is limited to a certain specified sum, but the liability of a general partner is unlimited. Limited partnerships must be registered (at Bush House, London). A limited partner suffers many restrictions, one of these being that he may not, during the continuance of the partnership, receive back any portion of his capital, nor may he, as a general rule, interfere to any great extent in the conduct of the business.

PARTRIDGE. The name of a group of game birds belonging to the pheasant family. There are a large number of species, found

direction; or the beaters may drive the birds on to prepared positions, this being the method followed late in the season.

Scientific Name. True partridges belong to the family *Phasianidae*. The scientific name of the grey partridge is *Perdix perdix*.

PARTS OF SPEECH. Words are said to belong to one or other of eight "parts of speech," according to their grammatical function in a sentence. The parts of speech are: noun, pronoun, verb, adjective, adverb, preposition, conjunction, and interjection. See separate articles.

PARTY SYSTEM. See **POLITICS AND POLITICAL PARTIES**

PARTY WALL. A wall or fence dividing the lands of two adjoining owners, and standing partly on the land of one owner and partly on the land of the other. In the absence of any express agreement between the two owners, a party wall is regarded by law as divided down the middle, one half belongs to each owner, but each has certain rights over the other's half. Either owner may repair the wall, but neither is bound to repair it, and if either of them injures the wall he is liable in damages to the other.

PASCAL, BLAISE (1623-1662). A French mathematician and religious writer, born at Clermont-Ferrand. He was a precocious child, and his later life was one of great performance. He early attracted the attention of Descartes and others by his mathematical genius, displayed particularly in his *Geometry of Conics*, which appeared in 1639. Through his sister he became interested in Jansenism, and in 1654 allied himself with the convent at Port Royal. Though observing its rule in part, he never actually became one of its members. In 1656-1657 he wrote his *Provincial Letters*, directed against the Jesuits in reply to the condemnation of Arnauld, a leader of Port Royal, by the Sorbonne, for heretical doctrine.

Pascal's *Thoughts*, published posthumously and in a bowdlerized form in 1670, deals—in a way which gives a true idea of Pascal's mind—with religion, life and philosophy. The work is now published as Pascal wrote it. Despite poor health and physical suffering, he decided to supplement the destructive criticism contained in *Provincial Letters* with an *Apology for the Christian Religion* (a defence of Jansenism), which was never completed.

His work in mathematics and physics has been of value to posterity. He was the first to attempt a philosophy of mathematics. His work on the pressure of liquids, with the formulation of the physical law known by his name, is applied practically to-day in hydraulic presses, lifts and jacks, and in its application to gases, is the working principle



ENGLISH PARTRIDGE

The hen bird prepares to lead the chicks from the nest.

Photo: E. J. Hocking

mainly in the northern hemispheres of the Old and New Worlds, and the most typical representative is the common grey partridge. This species is found throughout Europe, especially in Great Britain, and in Western Asia. The largest specimens are about 1 ft. long. The bird has ash-grey plumage on the upper parts of the body, with brown and black markings, and the male has a distinguishing crescent-shaped spot of deep chestnut on the breast. Grains and insects are sought as foods, the nest is laid usually on the ground, and contains from twelve to twenty eggs.

Partridges feed at morning and evening, remaining hidden during the day in turnip fields, etc. A common method in partridge shooting is for a number of beaters, accompanying the sportsmen, to sweep through a field or along hedgerows in a down-wind

on which vacuum pumps and air compressors are based.

Pascal's Law. Any external force exerted on a unit of area of a confined liquid is transmitted undiminished to every unit area of the interior of the containing vessel.

PASCHAL. The name of two popes and of one anti-pope.

Paschal I (d. 824). A Roman, chosen in 817 by the clergy of his city, he was never on cordial terms with the Emperor, Louis the Pious. The slackening of imperial power after the death of Charlemagne is shown by this election and Louis' acceptance of it. Paschal's tenure of the Papacy was troubled by dissensions at Rome.

Paschal II (d. 1118). Becoming Pope in 1099, he inherited the struggle with the Empire over investitures--whether ecclesiastics, whose office made them also great landowners, should be invested by the Church or by the Crown. In 1105 he encouraged the betrothment of Henry IV by his eldest son, only to find the new Emperor, Henry V, still more resolute an opponent. When Henry V came to Rome for coronation in 1111, Paschal suggested that German bishops should renounce their feudal lordships and be excoisited by the Church as spiritual leaders. Henry seized the Pope and was crowned on his own terms. On his release, Paschal continued the struggle and in 1112 approved the excommunication of the Emperor. Driven from Rome by imperial troops in 1115, Paschal returned shortly before his death.

In 1107 he had approved the settlement between Henry I and Anselm of the investiture problem in England.

Paschal III. Anti-Pope. The Emperor Frederick I, during his struggle with the Papacy, recognized as Pope from 1164 to 1168 his own nominee, Guido of Crema, who was enthroned in 1167, during the occupation of Rome by an imperialist army.

PASHA, pā shah'. A Turkish title of honourable rank, originally reserved for princes of the royal blood, later bestowed on provincial governors, military and naval commanders, and men prominent in civil life. Pashas are of three grades, distinguished by the display of one, two or three horsetails on their ceremonial lances. The Pashas of highest rank bear three horsetails. The second syllable of the word "pasha" is cognate with "Caesar," "Kaiser," "Tsar," and "Shah," signifying a king or ruler.

PASQUE, pask, FLOWER. A variety of anemone (*A. pulsatilla*), native to Britain. Its violet-hued flowers appear on a nine-inch stalk at Eastertide.

PASSCHENDAEL, pash' en deel. A town and ridge of West Flanders, north-east of Ypres; the scene, in October and November,

1917, of some of the bitterest fighting in the World War (which see).

PASSION FLOWER. A name applied by early Roman Catholic missionaries in America to certain plants whose flower parts, they fancied, represented Christ's Passion. For example, the fringes in the flower they thought were symbolic of the crown of thorns; the five anthers, of the marks of His wounds. The divisions of the pistil represented the nails of the Cross, and the stamens, the hammers that drove



PASSION FLOWER
Photo: Visual Education Service

them in. The leaf symbolized the spear, the tendrils represented whips and cords. The column of the ovary was the pillar of the Cross, the calyx, the glory of the nimbus.

The species of the passion flower genus are found chiefly in tropical and semi-tropical regions of America. Some kinds grow in Italy and other warm countries of the Old World. Certain varieties may be grown outdoors as climbers in warm parts of England.

Scientific Name. The passion flowers belong to the family *Passifloraceae*.

PASSION PLAY. The ancient ritual of the Roman Catholic Church provides that the singing of the Liturgical Gospel on Good Friday should be divided among various persons representing the characters in the story. It is out of this custom that the Passion Play grew--a drama depicting the events connected with the Crucifixion of Jesus.

The first Passion Play of the thirteenth century, if it may be called a play, was not much more than a chanted recitation of sentences from the Gospel with hymns added, and with characters brought into the action, such as the Mother of Jesus, who

are outside the story as given by the Evangelists.

The evolution of the Passion drama, thus tentatively begun, was then of rapid growth. There were several elaborate plays of the fourteenth century, embracing the whole history of the Redemption of man, from the fall of Lucifer to the Death of Christ. Later the drama was made to begin with the Creation of man, and end with the Coming of the Holy Ghost at Pentecost.

Enthusiasm for these plays reached its zenith in the fifteenth century, and the Tyrol was the scene of their most elaborate production. The scenery, in accordance with the ideas of the age, and the stage accessories were naively simple; the dresses and other accessories, on the other hand, were extremely rich, and the cities vied with one another in aiming at magnificence in these respects. The performers gave their services, and were chosen from all classes of the citizens, by whom the play was considered to be a devotional exercise.

In the sixteenth century, partly owing to the influence of the Reformation and partly to a growing tendency to vulgarize the dramas, they began to decay. They were strongly revived in the Tyrol and in Bavaria in the latter half of the nineteenth century, and several are now regularly performed periodically in those districts. The famous

Sunday in Lent, marking the beginning of His Passion, or final sufferings. Beginning with Passion Week, the Roman Church veils all sacred pictures, crucifixes, and statues



OBERAMMERGAU

The theatre in which the Passion Play is acted

Photo: U & U.

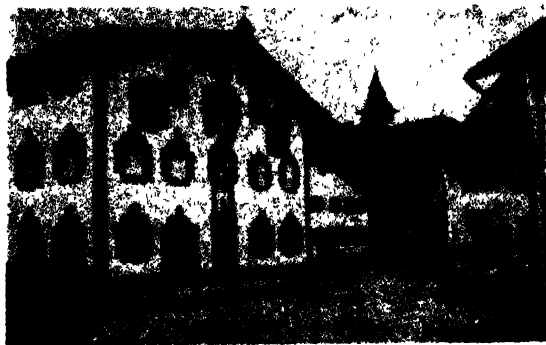
until Holy Saturday evening. This custom is also followed in some Anglican churches. See LENT.

PASSEOVER. The chief feast of the Jewish religion. It takes place at the time of the first full moon of spring, on the fourteenth day of Nisan, the first month of the sacred year, and commemorates the sparing of the Hebrews on the eve of the Exodus from Egypt, when God smote the first-born in every Egyptian home but "passed over" the Israelite houses, whose doors had been marked by the blood of a lamb. At that time, by Divine command, the lamb was slaughtered with religious ceremony, and then roasted and eaten, together with unleavened bread and bitter herbs. The eating of unleavened bread (*mazzoth*) for seven days is an integral part of this memorial feast, which was therefore frequently called the feast of unleavened bread.

Definite rules for the festival appear in Exodus xii, but there are only a few references to the observance of the feast in the Old Testament. By New Testament times, however, the keeping of the Passover feast had become regular and general, and the number who took part in it was very large. In many Jewish homes at the present day

the feast is kept up with little alteration from the ceremonies prescribed in Biblical times.

The ritual, both of the sacrifice and of the Paschal meal, was extremely elaborate. The feast began with the "Evening" (first half of the day) of the 14th Nisan. All leaven



STREET IN OBERAMMERGAU

The houses are decorated with frescoes of scenes from the Passion.

Photo: U & U.

Passion Play of Oberammergau (see OBERAMMERGAU) is the best known of all the Passion dramas.

PASSION WEEK. Christian bodies use this term to describe the week in Christ's Life which begins on Passion Sunday, the fifth

was then put away. The sacrificial lambs were killed in the Temple at 1.30 o'clock, accompanied by the singing of psalms, and the proper parts having been prepared and set aside for sacrifice, they were offered with incense on the altar. The various companies which had taken part in the offering were then dismissed to their homes to partake of the feast.

This was eaten in festival garments, and not, as enjoined in the institution, in travelling dress, and the viands were the lamb, bitter herbs, and the sauce called *haroseth* (the "sop" of St. John xiii. 26). Four cups of wine were drunk; and during the meal, a son of the family asked its meaning, being answered by the father, who related the events of the patriarchal history of the nation up to the time of the Covenant with Moses at Sinai.

The Last Supper of Our Lord and His disciples was held on the first day of the Passover, the same evening that He was seized by Roman soldiers through the betrayal by Judas. The second day was that on which the people clamoured for the release of Barabbas and when Jesus suffered crucifixion.

PASSPORT. An official document granted by the authority of a nation to one of its citizens or subjects, to enable him to travel in foreign lands. It is the certificate of his citizenship, and requests for him safe passage and all lawful aid and protection while abroad. Most countries on the continent of Europe require that travellers shall possess passports. In Great Britain, passports are granted by the Foreign Office only to natural-born British subjects, or to persons naturalized either in the United Kingdom or in the British Dominions.

Applications for passports must be made in writing to the Passport Office, 1 Queen Anne's Gate Buildings, London, S.W.1, or to the branch office, 36 Dale Street, Liverpool. The charge is 15s., whatever number of people may be covered by it. A statement of the requirements of foreign countries with regard to passports may be obtained upon application to the Passport Office. Affixed to the passport must be a specimen signature of the holder and a recent photograph. The passport is available for travel to only the countries named, but may be endorsed for other countries. The *visa* (the official endorsement on a passport to the effect that it has been examined and passed) of the consular representative of the country to which the bearer intends to travel is necessary for each journey, except where a continuing *visa* has been obtained.

PASTEBOARD. See CARDBOARD.

PASTEUR, *pas tur'*, LOUIS (1822-1895). A French chemist and biologist. It was he

who really founded the science of bacteriology. Before his time, it was generally believed that lifeless matter was transformed into living substance by a process called "spontaneous generation." Pasteur proved that the living forms which appear in liquids, as in fermentation, are always transmitted from the air in the form of invisible organisms (germs), and that this process can be controlled or prevented. As a result of this discovery, the preventive treatment of infectious diseases has become possible.

Pasteur was born at Dôle, in the Jura district of France. At the age of twenty he began the study of chemistry at the École Normale in Paris, later specializing in that subject at the Sorbonne. In 1867 he was appointed professor of chemistry in the Sorbonne; and in 1888, when his labours were crowned by the dedication of the Pasteur Institute, he became its Director.

His study of the process of fermentation, and of the bacteria that affect spirituous and malt liquors, resulted in improvements in brewing, distilling, and wine-making, and he saved the silk industry of France by discovering the parasite that was causing the ruinous silkworm disease. He laid the foundation for the isolation of the germs of tuberculosis, cholera, diphtheria, lockjaw and other infectious diseases; he discovered the method of checking hydrophobia by inoculation; and he showed how anthrax in cattle and sheep, fowl cholera, and similar diseases of animals could be prevented or conquered. The process of arresting fermentation in milk, known as *pasteurizing* (see MILK), is another result of his labours. Pasteur also made valuable contributions to antiseptic surgery.

At the Pasteur Institute in Paris, and in sister institutions in many other countries, research work in bacteriology is constantly carried on. See BACTERIA.

PASTON LETTERS. A series of letters, of great historic importance, which passed between various members of a Norfolk family named Paston. The earliest known member lived at Paston near Norwich, and died in 1419. The letters cover a period of



PASTEUR
(Painting by A. Edelfelt)
Photo Keystone

about 100 years when—particularly under Henry VI—the rule of England was in weak hands, and the struggles between the barons passed from legal battles to actual passages at arms.

PASTORAL EPISTLES. The name given to the personal letters written by Saint Paul, soon after his release from his first imprisonment, and addressed to his disciples Timothy and Titus. The title "Pastoral" is applied to them because they deal largely with the relations and duties of the bishop, or pastor, to his flock.

PASTORAL POETRY. In general, any poetry treating of country life. Specifically, it is an artificial form which uses shepherds and shepherdesses as its characters, and has a rural setting, with love as its theme. Almost invariably it has flourished when life was corrupt, or at least divorced from Nature. Among the Greeks, pastoral poems were known as idylls, and were most successfully attempted by Theocritus. Virgil's *Eclogues* and the poems of Horace and Tibullus are all the writings of sophisticated city-dwellers who play at country life.

In England, the first pastoral of note was Spenser's *Shepherd's Calendar*, which appeared in 1579, and for the next twenty-five years, no other theme was so common in English literature as the more or less artificial longing for rural simplicity. Marlowe wrote the *Passionate Shepherd*, Sidney the *Arcadia*,

Ben Jonson *The Sad Shepherd*, and Shakespeare *As You Like It*. Milton's *Comus* and *Lycidas*, the one a masque, the other an elegy, both have the pastoral setting. Pope's pastoral poetry is thoroughly conventional, but such later poets as Cowper, Burns, Shelley and Wordsworth show in their work the true love and understanding of nature. See ROMANTICISM.

PASTRY. Baked paste, made principally of flour; and the articles of food made from such paste. Pastry is of different types, according to the purpose for which it is intended. All pastry is cooked in a hot oven, especially puff pastry, which is rather rich, very light, and is used for tarts and fancy cookery, as opposed to ordinary short pastry, which is the covering for pies, and ordinary jam and fruit tarts.

The principal ingredients of all pastry are flour, fat (lard, dripping, margarine or butter) and cold water. Salt is added for flavour, also lemon juice. In short pastry, the flour and lard are in the proportion of 2 : 1 by weight, in puff pastry they are equal. With self-raising flour, there is no need to add baking powder.

Pastry is made on a clean wooden board with a wooden rolling-pin, and the hands must be scrupulously clean.

PATAGONIA. The southern part of the Argentine Republic, between the Rio Colorado on the north and the Strait of Magellan



PATAGONIAN INDIANS
Visual Education Service

on the south. It includes also a small area of Chilean territory along the strait. The total area is about 300,000 square miles. Structurally it consists of an elevated irregular plateau, rising in places to 3000 and 5000 ft. and sloping down to the east, with low plains on the coast only around the mouths of the larger rivers; glacial debris and lava flows cover large areas. On the west the plateau ends abruptly against a deep trough which intervenes between it and the Andes, and is blocked in places by moraine matter and lava and contains several lakes. Rivers, in deep trenches, cut across the plateau from the Andes. The climate is cold and windy throughout the year and the rainfall is slight, but more in the west than in the east. There are some forests of cedar, cypress and larch near the Andes, but grassland and, in places, poor scrub is the predominant vegetation. Scanty water-supply prevents any dense population, in the Rio Negro valley a million acres are capable of improvement by irrigation, and already 130,000 acres are being cultivated. The wealth of Patagonia, however, lies in its pastures, cattle in the sub-Andine zone and sheep on the plateau. There are now about 400,000 cattle and 12,000,000 sheep, the latter mainly for wool. Petroleum is found in the Gulf of St George, and there is some poor coal. The original population of Patagonian Indians has dwindled to small numbers, who still hunt the guanaco and the rhea. The white population, which numbers about 150,000, is mixed, being of Spanish, Italian, Russian and Boer descent. The small settlements are all seaports; the largest is the Chilean town of Magallanes, formerly Punta Arenas. Patagonia was discovered and named by Magellan in 1520. See ARGENTINA; CHILE.

PÂTÉ DE FOIE GRAS, *pat' eh dè fwah grah*. See GOOSE.

PATENT, *pay' lent*. An official document, issued by a national government, securing, to one who has invented some new process, the exclusive right of working and marketing it for a limited number of years.

English Patent Law. In order to obtain a patent, an inventor must apply on a form obtainable at the Patent Office, stating that he is in possession of an invention of which he claims to be the true and first inventor; and this application must be accompanied by either a *provisional* or a *complete specification*. A specification is a description of the invention, its nature, how it works, and the uses to which it can be put, and should be illustrated, if necessary, by drawings. A *provisional specification* is a general description, sufficient to make it clear what the invention is; a *complete specification*, which,

if not delivered with the application, must be sent in not more than twelve months later, must give a fully detailed description. Applications for patents come before the Comptroller-General of Patents, Designs and Trade Marks, who in turn refers them to an "examiner," whose task it is to see whether the application and specification are in order, and to turn up the records to see if the invention is original. On accepting the complete specification, the Comptroller advertises it in the Illustrated Official Journal, and for two months after this anyone having a bona fide interest in the matter can give notice at the Patent Office that he opposes the grant of the patent. The principal grounds of opposition are either that the invention is not original, or that the complete specification does not fairly or adequately describe it, or does not sufficiently correspond with the provisional specification.

What May be Patented. According to the Statute of Monopolies, the invention must be a "manufacture", i.e. it must be a *process for making something*. A method of *doing* something, e.g. of cataloguing, cannot be patented, nor can a general principle, nor a new substance. The process must also be *new*. A mere adaptation of an existing device to a new use cannot be patented, unless the adaptation involves practical difficulties which it required inventive talent to overcome. "New" means new to the public of Great Britain, the fact that a process has already been invented by someone else is no obstacle if the process has been kept secret. But the least *publication* of the invention is fatal to the grant of a patent, whether the publication is by exhibition or sale to the public, or by publishing a description of the invention. Finally, the invention must be *useful*, though very slight utility will suffice.

Abuse of Monopoly. A patentee is not entitled to use his patent to prevent the invention from being enjoyed by the public. In certain circumstances—e.g. if, after three years from the grant of the patent, the invention is not being worked on a commercial scale in the United Kingdom, and no good reason is shown for this, or if the demand for the article is not being adequately met on reasonable terms—anyone interested can apply for relief against this abuse of the monopoly. Relief will consist either of compelling the patentee to grant a licence on reasonable terms to the applicant to work the invention, or of revoking the patent.

Infringement. The patentee is entitled to sue anyone disobeying the King's command not to infringe his monopoly, and to claim an injunction and damages. It is a good defence to an action for infringement to

show that the patent ought never to have been granted, and is therefore invalid.

Renewals and Extensions. A patent lasts ordinarily for sixteen years, but after the third year it must be renewed annually on payment of a fee which increases each year. After the sixteen years are up, the patent can be extended for five years (in exceptional cases for ten years) on a petition being presented to the Court; but this extension will be granted only where the invention is very useful, and the Court considers that the inventor has been inadequately rewarded.

In the Dominion of Canada. The British North America Acts give the Canadian Parliament exclusive control of patent legislation. The first comprehensive patent laws were those of 1859. A revision of the Canadian Patent Act became effective on 1st September, 1923.

In the Dominion, a patent may be granted for a term of eighteen years. An examination is made to determine whether the new device offered is patentable; an appeal from an adverse decision of the Commissioner of Patents goes to the Executive Council for decision. A patent becomes void if it is not commercialized within two years of the date of the grant.

PATERNOSTER, *pat' er nos' ter*. See LORD'S PRAYER.

PATERSON, WILLIAM. Founder of the Bank of England and chief promoter of the Darien Scheme. See DARIEN.

PATHANS, *pā'tahnz'*. 'One of the chief native races of Afghanistan, numerous also in India, where they make excellent soldiers. They are of Iranian stock with Indian affinities.

PATHOL'OGY. The study of disease and injury in man and animals, and the reaction of the body thereto. This science is only about a century old, and originated in the observations made at post-mortem examinations with a view to explaining the signs and symptoms previously noted during life. The science has so expanded that to-day it includes several subdivisions, viz.—

1. **Morbid Anatomy.** This is the study of the anatomical changes which occur in the body as the result of disease or injury. It is carried on by the examination not only of the body after death, but also of organs and tissues removed by operation.

2. **Experimental Pathology.** By artificially producing diseases in animals, which can be killed at any desired stage in the development of the disease, we can learn a great deal about the processes concerned in their occurrence in ordinary life. As an example, a vast amount of experimental work has been done in recent years in the investigation

of cancer, and much has been learned from this.

3. **Morbid Histology.** The study in minute detail of the changes brought about by disease is conducted with the microscope. The technique involved in this department has been brought to a high degree of exactitude.

4. **Bacteriology.** The study of the micro-organisms which cause so many diseases. This branch of pathology is so important that it has become a science in itself. It may be said to date from the year 1849 when the bacillus of diphtheria was discovered, though it not for many years was its true nature understood.

5. **Clinical Pathology.** The investigation of materials obtained from sufferers in the course of their illnesses. Thus the minute examination of a few drops of blood taken from the finger is often of the utmost value to the physician in the diagnosis and treatment of his patient; or the microscopic examination of the exudation from an ulcerated throat may disclose the presence of the bacillus of diphtheria, and so establish the diagnosis. See VIVISECTION.

PATIALA, *pat' eah' la*. An Indian native state, forming part of the Punjab. It was founded about 1763 by a Sikh chieftain, and came under British protection in 1806. Population (1931), 1,125,520.

PATIENCE. The general name for some hundreds of card games played by a single person. Usually the object of any game of patience is to arrange the cards in sequence by suits, but there are a number of others in which various pairings and other combinations are attempted. Most of the games depend upon luck only, but in a number there is scope for some slight skill in the play.

PATKUL, JOHANN REINHOLD (1660-1707). Politician and agitator of Livonia. In 1689, when holding a commission in the Swedish army, he headed a deputation to protest against the king's (Charles XI) land recovery project. A year or so later, another petition resulted in his prosecution, and he fled to Switzerland. On the accession of Charles XII he sought pardon, but this was refused. Patkul then sought to ally Denmark, Brandenburg and Saxony against his native country. Eventually Peter the Great of Russia took the place of Brandenburg in the confederation and Patkul entered the Russian service. While on a diplomatic mission to Dresden he was arrested by the Saxon authorities, and, despite this breach of international law, was handed over to Charles XII who had him executed as a traitor.

Patkul's fate provided the basis of a tragedy by Gutzkow.

PATMORE, COVENTRY KERSEY DIGHTON (1823-1896). Poet. His best known work is *The Angel in the House*, in which his theme is married love. Patmore is not a major



COVENTRY PATMORE
(National Portrait Gallery)

poet; but he had a fine ear for the rhythms of English verse, and experimented with considerable success in both regular and irregular measures.

PATMOS. A volcanic island in the Aegean Sea, off the coast of Asia Minor. It is about 10 miles long and 6 miles broad. It is mentioned in the Bible as the island to which Saint John was banished, and where he received the visions described in the Book

of Revelation. A monastery in memory of Saint John was founded here in 1088. The island is bare and rocky, and the inhabitants are chiefly occupied in fishing. The chief harbour is Scala. Cotton stockings, knitted by the women, and pottery form the chief exports of the island.

PATNA, pāt' nā. See INDIA.

PATRIARCH, pay' trī ark. A word derived from the Greek term for "progenitor," the father of a tribe. In ancient times, a patriarch was the father or ruler of a family or tribe. The term was applied in Hebrew history especially to Abraham, Isaac and Jacob, the fathers of the Jewish nation. Abraham was the head of the patriarchs, and because he was the first to recognize the true God, the Jews were identified as "the people of the God of Abraham" (Psalm xlviii. 9). All the descendants of a patriarch were subject to his rule, and on his death he was succeeded by his eldest son. In later Jewish history, the president of the Sanhedrin, a council vested with civil and religious authority in Judea and Syria, was called patriarch. The term was carried over to the Christian Church, which applied it to important bishops. About the fifth century, the use of the title became restricted to the Bishops of Rome, Alexandria, Constantinople, Antioch and Jerusalem. The Greek Church yet retains the title. The Patriarch of Rome became later the Pope of the Roman Catholic Church. See ORTHODOX CHURCH.

PATRICIAN, pā' trīk' ian. In current speech, a term used to describe a person of distinguished bearing, and in this sense

derived from the political significance it had in ancient Rome. The original Roman people (*populus Romanus*) comprised all the free citizens of the State. Their descendants reserved for themselves the rights of citizenship—they were the "men with fathers" or *patricians* (from the Latin *pater*, father). But as Rome began to expand through conquest, and inhabitants of conquered towns were brought to the city, a new class arose, one having no political rights. These "common people" were the *plebeians*. The early history of the republic is largely the story of the struggle between the two classes. Gradually, the plebeians gained full political and social equality, partly by political action and partly by intermarriage between the two classes. Eventually, the term "patrician" implied no real superiority, political or social. The establishment of a new order of aristocracy, based upon wealth and office, followed. See PLEBEIANS.

PATRICK, SAINT (about 389-463). The patron saint of Ireland. Early authorities give his birthplace as Bannauenta or Bonavem, but whether this was in Scotland near the modern Dumbarton, or near Daventry in Northamptonshire, or Boulogne in France is not agreed. At the age of 16, he was captured by pirates from Ireland and carried to that country, where for six years he tended the flocks of an Ulster chieftain. Later, on his escape to France, he entered monastic life. Directed by a vision to return as a missionary to Ireland, he obeyed the call in 432, and for the rest of his life worked zealously in various parts of the land. There he founded over 300 churches, and he personally baptized over 120,000 people.

Much that is told about the Saint is little more than legendary, for though he left an autobiography, or *Confession*, written in crude Latin, this places the emphasis on his work and not on his life. At least one relic of his times, a four-sided iron bell, is in the Museum of Arts and Sciences in Dublin.

The 17th March is celebrated as Saint Patrick's feast day.

PATROCLUS, pā' trō' klus. The friend of Achilles. See ACHILLES.

PATTI, ADELINA JUANA MARIA (1843-1919). Singer, one of the greatest sopranos of her or any time. She was born at Madrid. Her father was Italian, her mother Spanish, and both were gifted singers. When 16 she attracted unusual attention by her singing as Lucia in Donizetti's opera, *Lucia di Lammermoor*. Two years later she began to take leading operatic parts in London, and was acclaimed by the critics. Subsequent tours in France, Spain, Italy, Norway and Sweden were so successful that in many

of the larger cities of those countries, vast crowds of admirers followed her through the streets. She also frequently visited the U.S.A.

PAUL. The name of five Popes of the Roman Catholic Church. Of these, Paul I was Pope from 757 to his death in 767, and was the successor of his brother, Stephen III. This Pope had the support of the temporal power, for Pepin, King of the Franks, gave him assistance in his struggle against the Lombards.

Paul II, Pietro Barbo, was a nephew of Pope Eugenius IV, by whom he was created a cardinal in 1440. He succeeded Pius II in 1464, and, though no lover of learning, he appreciated and cared for Rome's antiquities. Tall, handsome and stately, he lived in great magnificence. His kindness and generosity outweighed his vanity. He checked the power of his cardinals, and quarrelled with Louis XI over the French church. He died in 1471.

Paul III was born in Tuscany in 1468, and was made a cardinal by Alexander VI in 1493. In 1534 he was elected to the Papal chair, and in that high office continued the efforts at reform which had marked his previous administration as Bishop of Ostia. In the interests of reform, he several times tried to summon a council, which finally met at Trent in 1545, having been repeatedly postponed because of the constant struggle between Francis I of France and the Emperor Charles V (see TRENT, COUNCIL OF). It was Paul III who excommunicated Henry VIII of England, and restored the Inquisition for the suppression of heresy. He also made Michelangelo chief architect of the Vatican and of St. Peter's. Paul III died in 1549.

Paul IV, Pope from 1555 to 1559. He was 79 years of age when he was elected to the Papal throne, but he showed an unexpected vigour and introduced many reforms. He reorganized the Inquisition, established a censorship of books, bettered the conditions of the poorer classes, and demanded a stricter administration of justice.

Paul V, Pope from 1605 to 1621, was of the famous Borghese family, and was made a cardinal in 1596. The first two years of his Papacy were disturbed by a dispute with the republic of Venice. Paul demanded that ecclesiastics should not be brought to trial before other than ecclesiastical tribunals, and when the Senate and the Doge refused to submit, he issued sentence of excommunication against them. Still they remained obdurate, and the controversy dragged on until 1607, when a compromise was at last effected by Henry IV of France. Paul V was active in the suppression of Leresy, the establishing of religious orders, and the promotion of the missionary movement.

PAUL-BONCOUR, *pôl bo:N koor'.* **JOSEPH** (born 1873). Already a French statesman of reputation as Minister for War, in 1932 he became permanent delegate to the League of Nations. Later in the same year he took the Premiership and the Foreign Office. In 1933 financial problems caused his resignation, but he was retained at the Foreign Office by Daladier, Sarraut and Chautemps in turn. He was not included in the Daladier Cabinet of 1934. He remained a prominent figure of the Republican Left, and in 1936 was reinstalled as Foreign Minister by M. Sarraut, though he was not given that office in the Popular Front Ministry of M. Blum.

PAUL KARAGEORGEVITCH, PRINCE OF YUGOSLAVIA (born 1893). Prince Paul is the third son of Peter I of Serbia. His eldest brother withdrew from the succession and later died, the second son of Peter I becoming King Alexander of Yugoslavia in 1921. Alexander was murdered at Marseilles in 1934; by the terms of his will, Prince Paul became the premier Regent for the child King Peter II, his colleagues being Dr. Radenko Stankovitch and Dr. Ivo Petrovitch.

PAUL, SAINT. Apostle of the Gentiles. Born at Tarsus in Cilicia, a Jew of the tribe of Benjamin, and, by inheritance from birth, a Roman citizen—this latter fact giving him the name Paul in addition to his Jewish name Saul—the great Christian was educated first at Tarsus, where, according to Jewish custom, he learned the local trade of tent-making, and later at Jerusalem.

He appears first in history at the stoning of Saint Stephen (A.D. 35), to which he was a consenting party through his hatred of the new sect, which he regarded as apostasy from the truth. Shortly afterward, filled with persecuting zeal, he set out for Damascus, armed with credentials to the Jewish synagogue there and to the Governor, for the purpose of apprehending any Christians he might find.

On the way occurred his miraculous conversion (see Acts ix). Arriving at Damascus, he was baptized and, after spending a short time there, retired into the Arabian desert to ponder the revelations he had received. On his return to Damascus he preached the new doctrine, but when his life was endangered by a plot, he was compelled to flee to Jerusalem (A.D. 37), where he saw Saint Peter. In that city, however, the Greek-speaking Jews were no less hostile, and after fifteen days he was obliged to return to Tarsus, where he remained in obscurity for about six years. At the end of that period, he was invited by Saint Barnabas to Antioch in Syria, and there for the space of a year the two worked together with much success. From the end of that visit begins the

remarkable series of missionary journeys that made up the greater part of Saint Paul's ministerial life (which he sums up, so far as his own personal adventures and sufferings are concerned, in the famous passage in II Corinthians, (xii 21 ff.).

They occupied a period of about twelve years (A.D. 45-57), and by the end of that time, the Apostle had established, during

and the power of his personality and preaching, he had astonishing success in making converts in the populous and cosmopolitan cities which he visited. This success appears almost incredible when the shortness of the period in which it was attained, the difficulties and dangers of the journeys, the opposition of the Jews, and the moral condition of the heathen cities to which he preached, are taken into consideration. During these journeys he was helped at various periods by Barnabas, Silas and especially Saint Luke, who was his companion and physician during the greater part of his second and third journeys, and in the latter part of his life.

The next stage is that of his captivity. Having arrived at Jerusalem in A.D. 57 after the conclusion of his third journey, he was falsely accused of having brought Gentiles into the Temple, a riot, in which he nearly lost his life, flared up, and he was only rescued at the last moment by the Roman tribune in charge of the Tower of Antonia. Later, in order to save him from a new plot by his enemies, Lysias the tribune sent him under guard to Caesarea. There he was kept in prison for two years by Felix the Procurator, and when Festus arrived at the expiration of that time to supersede Felix, Paul was brought up again for examination.

Fearing that if he should be sent back to Jerusalem his Jewish enemies would murder him, the Apostle appealed to the Supreme Court of the Emperor at Rome. He had an adventurous voyage thither, which included the total wreck of his ship on the island of Malta, very vividly described in the Acts. On his arrival at Rome, all that Saint Luke records is that Paul remained under the guard of a soldier for two years in a house which he had hired.

There, in A.D. 60, the story of the Acts ends. That Saint Paul was tried and acquitted is certain, but for a further period of his life there is little but conjecture and legend. His end came finally at Rome, where, according to a trustworthy tradition, he was martyred toward the end of the reign of Nero, probably in A.D. 67.

His *Epistles* embody doctrine animated by intense personal faith. His letters to the Churches prove the depth of his thought and the power and versatility of the expression not only of his theology, but of the character and feelings of the writer. Such eloquent passages as the famous thirteenth chapter of I Corinthians and the equally lofty strain of the first ten verses of the 6th chapter of II Corinthians are profound teaching, clothed in immortal language.

The *Epistles* contain a body of theology



SAINT PAUL

Medieval terra cotta statuary

Photo: Victoria and Albert Museum

his first journey, Churches in Cyprus, Antioch in Pisidia, Iconium, Lystra and Derbe. During his second journey, when he passed over into Europe, he founded flourishing congregations in Philippi, Thessalonica, Athens and Corinth; and in his third journey, he accomplished much successful work in Galatia and Phrygia, finally founding the great Church of Ephesus.

Everywhere pursued by the hatred of the Jewish factions and often, through false accusations, coming into conflict with the Roman secular arm, by his indomitable spirit

which all Christians have considered to be a priceless heritage, and which has had a vital influence on Christian teaching. The great Epistles to the Corinthians, the Galatians and the Romans were written during the third missionary journey; those to the Colossians, Ephesians and Philippians fall under the period of the captivity at Rome; the first letter to Timothy and that to Titus belong to the period after the Apostle's release, and the second letter to Timothy to his last imprisonment.

It is from the Epistles that we gain sidelights on Saint Paul as a man—his fiery zeal for his mission, his courage and patience under suffering, whether caused by others or by the physical infirmity to which he alludes as "the thorn in the flesh"; the alternating moods of exaltation and depression, natural to one of his temperament; his severity and his gentleness; and his capacity for deep affection and loyalty toward his friends and disciples. Saint Paul was fair, bearded and of short stature—"a man of three cubits" (about 5 feet) is a contemporary description.

PAUL, TSAR OF RUSSIA (1754-1801) The son of Grand Duke Peter and his wife Catherine, he was brought up by his great-aunt, Empress Elizabeth. He was still a child in 1762, when his father succeeded as Peter III, only to be displaced by Catherine. The savage, magnificent court of Catherine the Great was filled with intrigues, political and amorous, and Grand Duke Paul must have been adversely influenced by its licence. In his early twenties he accused his mother of attempting his murder, and before long he developed signs of insanity. He succeeded to the throne in 1796, and his mental instability was reflected in his policy. He joined in 1799 the coalition of Britain and Austria, because Napoleon had invaded part of the Turkish Empire, which the Tsar thought should some day fall to Russia. Lack of military success made him weary of the coalition. Napoleon became First Consul, and Paul, swung round almost to alliance with France, forming the Armed Neutrality of the North to check the influence of Britain. In 1801 he was murdered in a palace conspiracy led by Count Pahlen.

PAULINUS, pau li nus. Surname of two distinguished Romans. *Pompeius*, who commanded in Germany in A.D. 58, was probably the father-in-law of Seneca. *Caius Suetonius* served under the Emperors Claudius and Nero. Under the former he commanded in Mauri-

tania in the Moorish revolt in A.D. 42, while under the latter he had command of Britain from 59 to 62. During his temporary absence on an expedition to Anglesey (Mona), occur-



SAINT PAUL'S MINISTRY

The house traditionally believed to be the one from which Paul escaped the fury of the Jews when he was "let down by the wall."

Photo: OROG.

red the revolt against Rome organized by Boadicea (Boudicca), in the year 61. Paulinus returned swiftly to put down the rebellion, Boadicea ending her own life. On his return to Rome he held office as Consul and in 68 saw service in the Vitellian war under the Emperor Otho.

PAULINUS, SAINT (d. 644) Gregory, the Great, who had sent Augustine to England in 597, sent Paulinus to aid him four years later. Ethelbert of Kent had been induced by his Christian wife to receive the missionaries, and when his daughter married Edwin of Northumbria she too persuaded her husband to listen to their teaching. Paulinus converted Edwin in 627 and became Archbishop of York. The Northumbrians, however, had accepted rather than welcomed Christianity, and they relapsed into paganism when Edwin was slain by the heathen Penda of Mercia in 633. Paulinus returned to Kent and became Bishop of Rochester.

PAUMOTU ISLANDS. See PACIFIC ISLANDS.

PAUSANIAS, pau say' nias. A Spartan of royal family, son of Cleombrotus, nephew of Leonidas. Though he never became king himself, he acted as Regent for the son of Leonidas, Pistarchus. In 479 B.C. Pausanias was put in command of the Lacedaemonian expedition to assist Athens in the war against the Persians, and under his command the allied Peloponnesian forces defeated the Persian army commanded by Mardonius at Plataea in Boeotia. This decisive victory, which secured the independence of Greece, was followed up in 477, again commanded by

Pausanias, when the confederate fleet drove the Persians out of Europe and captured Cyprus. Victory went to Pausanias' head, and he projected to make himself tyrant of Greece. Twice he was arrested and acquitted at his trial. When discovered for the third time, he knew he could not hope for an acquittal, and when his arrest was attempted, he took refuge in a temple of Athena as sanctuary. This was in 479. But he was not destined to escape. The Spartans walled up the door of the temple, and carried him out at the point of death, so as not to defile the sanctuary.

Of the same name was the Hellenistic Roman traveller and geographer who lived under the Emperors Marcus Aurelius and Antoninus Pius. His main work is an itinerary of Greece, covering the whole Hellenic world and full of minutest detail and wealth of observation.

PAVEMENT. See ROADS AND STREETS.

PAVIA, *pà ve' a*. See ITALY.

PAVLOVA, ANNA (1885-1931) Russian ballerina of outstanding genius, was born in St. Petersburg (Leningrad). Trained in the Imperial Royal Ballet at the Marianski Theatre, she became *première danseuse* at the age of 16. In 1908 she joined Diaghilev's company and toured Europe and U.S.A. In 1911 Pavlova came to London, and in association with Nijinsky at Covent Garden forthwith established herself as a consummate and incomparable artist. By her mastery of the traditional technique of the ballet, united with a highly imaginative expression, she lifted her art to an altogether new level. Among the best known of her dances were *Les Sylphides*, *La Nuit Egyptienne*, *Le Cygne* and *Pavillon d'Armide*.

PAWL. See RATCHET.

PAWNBROKER. One whose business it is to lend money at interest, on the security of goods or negotiable instruments deposited with him by way of pledge. The essence of a pledge is that the creditor receives possession of the security and is entitled to retain it until the debt is paid off; in certain circumstances he may keep the pledge permanently in lieu of payment, or may sell it and pay himself out of the proceeds. Special laws have been passed dealing with pawnbrokers, but these laws apply only to loans of £10 or less; loans over that amount are governed by the general law of contract and also by the special laws applicable to moneylenders (which see). A pawnbroker who does not lend sums over £10 need not be licensed as a moneylender, but he requires a special pawnbroker's licence (annual fee £7 10s.). When goods are pledged to a pawnbroker, a written contract, called the *pawn ticket*,

must be given to the debtor, setting out the conditions of the loan. A pawnbroker must not accept a pledge from a child under 14 (16 in London and Liverpool) or anyone apparently drunk. A debtor is entitled to redeem the pledge, i.e. reclaim it on payment of principal and interest, at any time up to a year and seven days from the date of the loan. After that time, the pledge becomes the property of the pawnbroker if the loan was 10s. or less; if it was more, the pawnbroker is entitled to sell the pledge by auction and, after paying himself principal and interest, must hand over any surplus to the debtor.

Rates of Interest. The maximum rates of interest are fixed by law in certain cases, viz. (a) for a loan of £2 or less: a halfpenny per month per two shillings, plus a charge for preliminary expenses, called *ticket-money* (a halfpenny for each five shillings, plus a halfpenny on a loan of ten shillings or less and a penny on a loan over ten shillings); (b) on a loan over £2 *ticket-money* as above; interest a halfpenny per month per two shillings and sixpence, but this rate can be varied if the parties enter into a *special contract*. Special contracts can be modified by the Court if they are unfair.

Pawnbroker's Liability. Where goods are lost, destroyed or damaged while in the pawnbroker's possession, the pawnbroker is not liable for their value unless the loss is due to his negligence or wilful wrongdoing. But where the goods are destroyed by fire, the debtor is entitled to be released from his debt and, in addition, to receive as compensation one-quarter the amount of the loan.



PAW-PAW

Showing leaf formation and fruit cluster.



PAPAWS

Photo Australian Trade Publicity

PAW-PAW OR PAPAWE. A small American tree or shrub, producing a fruit of the same name, resembling a banana.

Another tree called *papaw*, or *papaya*, is grown in the tropics for its edible fruit. This species is a member of the passion-flower family. It is a palm-like tree, with its leaves grouped in the form of a rosette at the top of the unbranched stem. The fruit looks like a musk-melon, and has a yellow flesh; this is eaten as dessert or in salads when ripe, and boiled as a vegetable when unripe.

Scientific Names. The American paw-paw belongs to the family *Annonaceae*. Its botanical name is *Asimina triloba*. The tropical species belongs to the family *Papayaceae* and is known as *Carica papaya*.

PAYMASTER-GENERAL. An office which in 1835 and 1848 centralized and consolidated several pay departments of the British Government. The holder of it makes payments on behalf of Government departments as authorized by the Comptroller and Auditor-General. It is a political office and unpaid, the actual duties being performed by the Assistant Paymaster-General appointed by the Treasury.

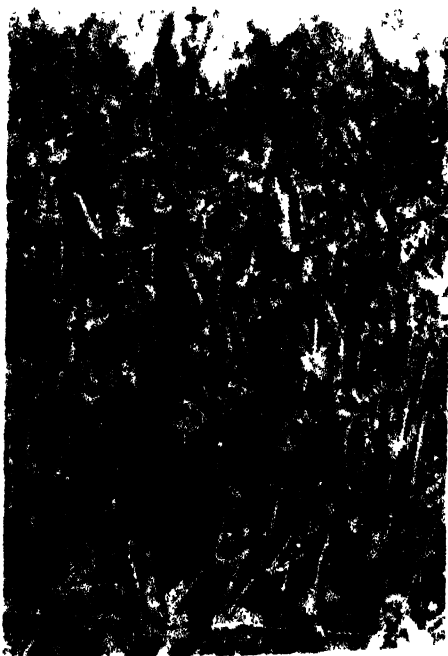
PEA. Common name of an important genus of plants of the pulse (legume) family, best known being the garden pea whose unripe seeds make so popular a vegetable. These are borne in oblong, green pods, which succeed the delicate white blossoms. There

are also several species that bear fragrant flowers and are widely cultivated as flowering plants. Among these are the *sweet pea* (which see) and the *everlasting pea*, both of which are grown from seed. Peas obtain support by means of tendrils which grasp strongly twigs or other projections, and some kinds reach a height of nine or ten feet. All species are supposed to be derived from wild plants; none of the cultivated kinds grow wild, however, except the *field pea*, grown as a farm crop and native to Italy.

The Common Garden Pea. Under cultivation, many varieties of the garden pea have been developed. The seeds are planted about 3 in. deep and about 2 in. apart in the row.

The "early" kinds planted in February are dwarf, while "main-crop" varieties are taller; by selection of varieties crops may be had from June till November. A rich soil deeply dug is desirable. The pea weevil or maggot, as well as thrips which destroy the young pods, can be controlled by spraying the flowers as they fade with a nicotine solution, since these pests make their entry through the flowers.

Food Value and Use. Peas are among the most nutritious of vegetables. They are cooked when freshly picked or after they have been dried, bottled or tinned. The dried peas are nutritious, but do not retain the

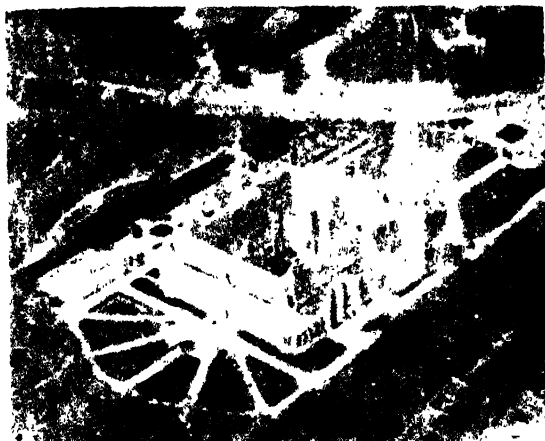


MAIN-CROP PEAS

Photo: Sutton & Sons

flavour as well as bottled or tinned peas. Dried peas have a high percentage of both protein and carbohydrates (starch and sugar), averaging 24.6 per cent of the former, and 62.0 per cent of the latter. Like other legumes, peas are a valuable tissue-forming food. Green peas are 7.0 per cent protein and 16.9 per cent starch and sugar.

Scientific Name. The pulse family (see LEGUMINOUS PLANTS) is called *Leguminosae* by botanists. The garden pea is *Pisum sativum*; the field pea, *P. arvense*. The sweet pea is *Lathyrus odoratus*, and the everlasting pea *L. latifolius*, or as now, *Sylvestris platyphyllus*.



PEACE PALACE AT THE HAGUE

Photo Central

PEACE, BREACH OF THE In a wide sense, all crimes may be said to be breaches of the King's peace. See CRIME—Criminal Law. The term is nowadays usually confined to actual assaults or threats of personal violence or conduct causing public alarm. Both constables and private persons are entitled to arrest a person about to commit a breach of the peace, for the purpose of restraining him until the danger is over. A constable is also entitled to enter a house to prevent a breach of the peace being committed therein. It is an offence to resist or obstruct a constable in the execution of his duty; it is also an offence to refuse, without lawful excuse, to give assistance when called on to do so by a constable who is unable to deal single-handed with a person or persons whose conduct gives rise to a breach of the peace. Even although no breach of the peace or other offence has actually been committed, a person whose conduct threatens to cause a breach of the peace, or has given another cause to fear personal violence, can be made to enter into recognizances to keep the peace.

PEACE CONFERENCE, INTERNATIONAL.

A congress of the Chief Powers assembled at intervals at The Hague, the ultimate object of which was to be the establishment of permanent peace, the more immediate aim being the settling of international controversies by arbitration and the lessening of wanton barbarities in war.

The conferences were initiated by Tsar Nicholas II of Russia, and the first congress met at The Hague on 18th May, 1899. One hundred delegates, representing the United States, Mexico, China, Japan, Persia and Siam, and about twenty European Powers, were present. Three chief questions occupied the attention of the delegates: armaments and weapons, humane regulations in warfare, and mediation and arbitration. Each nation was represented on every committee appointed, and each had one vote.

Resolutions set forth the conviction of the conference that the burden of armaments should be lessened and that the size of military and naval budgets should be studied with a view to reductions. Of the three conventions agreed to, one applied the humane provisions of the Geneva Convention to naval warfare. Another comprised a perfected code of the rules of war on land. The third dealt with arbitration.

The convention relating to mediation and arbitration was generally regarded as the most encouraging work of the conference. The Powers agreed to submit serious disputes to arbitration, questions involving "national honour" and "essential interests" being excepted. The machinery for adjusting grievances was provided for in a permanent arbitration body, which should meet at The Hague.

A second conference, held in 1907, attended by representatives of forty-four States, adopted thirteen conventions, intended to strengthen the cause of arbitration and prevent needless cruelty in war. It established an international Prize Court and insisted on the inviolability of the postal service. See ARBITRATION; INTERNATIONAL LAW.

PEACE CONFERENCE, WORLD WAR. See VERSAILLES, TREATY OF.

PEACE, THE KING'S. See MONARCHY.

PEACH. An orchard fruit of temperate climates. There is reason to believe that the Chinese cultivated peach trees no less than forty centuries ago, and China is probably the native home of this tree.

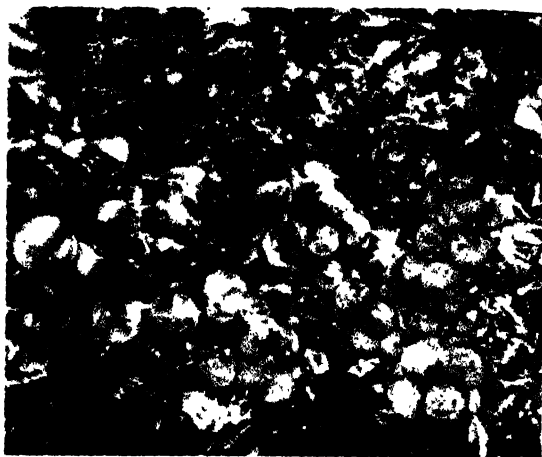
Though not so hardy a fruit as the plum, peaches are grown successfully in most European countries, Southern Canada, and U.S.A. In Britain peach trees need a south wall and some protection in spring.

As the seeds do not, as a rule, produce plants of their own type, desired varieties are obtained by budding on to seedlings.

Peach trees grow to a height of from 15 to 20 ft., and bear long, slender leaves and delicate pink blossoms. They begin to bear fruit about the third year after transplanting, but are short-lived; they like a well drained, porous loam.

Fresh peaches contain, on an average, 80.4 per cent of water, 0.7 per cent of protein, 0.1 per cent of fat, 0.4 per cent of carbohydrates (chiefly sugar), and 0.4 per cent of ash. Fuel value, 100 calories per lb.

Peaches belong to the same family as the apple, plum and pear, *Rosaceae*. The tree



PEACHES

Photo: Australian Trade Publication

resembles the almond (which see) in appearance. The cultivated varieties of peach are derived from *Prunus persica*.

PEACOCK. A bird related to the pheasant. The iridescent, greenish-blue neck and breast, and the long, tail coverts, brilliantly marked with bold, eye-like spots, give



PEACHES SUFFERING FROM BROWN ROT



PEACOCK

Photo: Photopress

peacock a plumage that is most decorative. The male bird is about as large as the domestic male turkey, the hen is smaller, less vividly coloured, and is without the train.

Varieties with white plumage are sometimes found in captivity. Common peacocks occur in a wild state in India and Ceylon, where, in the midst of many-hued tropical foliage, the vivid colouring is protective. These birds eat snails, frogs, and insects, as well as grain, juicy grasses, and bulbs, and are often destructive to growing crops.

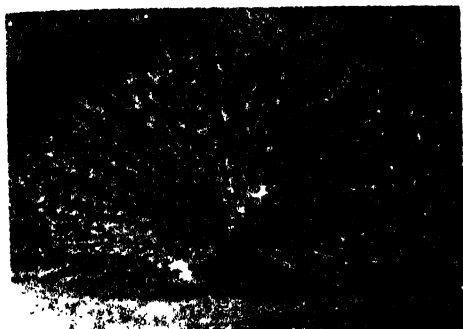


PEACH LEAVES SUFFERING FROM "LEAP CURL"

Another species, resembling the common peacock in plumage, but with golden-green neck and breast, is native to Burma, Malaya and Java.

The hen makes her nest in some secluded spot on the ground, laying ten or more brownish eggs.

During the reign of Solomon, "once in three years came the navy of Tharshish,



PEACOCK WITH TAIL SPREAD

Photo Bond

bringing gold and silver, ivory, and apes, and peacocks" (1 Kings, x. 22). The peacock is mentioned in the *Birds* of Aristophanes, written in the fifth century B. C., and Pliny speaks of it.

Classification. Peacocks belong to the family Phasianidae and the genus *Pavo*. The common peacock is *Pavo cristatus*.

PEACOCK, THOMAS LOVE (1785-1866) Novelist and poet. Peacock is one of those authors who will never have a large public, but whose admirers make up for the smallness of their numbers by their enthusiasm. The author of *Headlong Hall*, *Nightmare Abbey*, *Crotchet Castle*, and several other short novels, he makes his appeal to those readers who have a taste for the more intellectual qualities in literature—learned allusions, a mannered style, delicate



THOMAS LOVE PEACOCK
(National Portrait Gallery)

wit, distinguished conversation, and whimsical humour. To those who like him he is a rare wine, unique in English literature. He was an intimate friend of Shelley, whose noble *Defence of Poetry* was called forth by a paradoxical essay of Peacock's, *The Four*

Ages of Poetry, attacking the romantic poetry of the day.

PEAK, THE. The mountainous district of northern Derbyshire (which see).

PEAL. The name given in the West of England to the mature sea-trout. See SEA-TROUT.

PEANUT. The nut-like fruit of an annual plant of the pea or legume family, supposed to be native to Brazil and now cultivated in warm regions all over the world. Botanically, the peanut is not a nut, but is a fruit related to the pea and bean. The plant bears a profusion of yellow flowers, after which the pods appear, the fruiting stems then become bent down to earth, so that the pods ripen on or under the ground. Hence the alternative name "ground nuts," though this is also applied to a number of similar plants.

Peanut kernels, roasted and salted or used in confectionery, are highly popular, and though usually eaten as a confection rather than as a part of the regular diet, they are extremely nutritious. They contain lime, a bone-building mineral, as well as the growth-promoting Vitamin A and nerve-protecting Vitamin B (see VITAMINS). Furthermore, they have no waste tissue. Peanut culture is carried on principally in India, China, the United States, the Sudan, and the Dutch East Indies.

Scientific Name. The peanut plant belongs to the family Leguminosae. Its botanical name is *Arachis hypogaea*.

PEAR. An orchard fruit of the rose family, and thus related to the apple, peach, plum and cherry; of these it is most like the apple in general structure. A typical pear is irregularly cone-shaped, not round, but there are apples which look like pears, and pears which look like apples. The pear was known both to the Greeks and the Romans.

The cultivated pears of gardens and of commerce are derived chiefly from a native European species, *Pyrus communis*. The tree is widely distributed throughout temperate regions, but its cultivation has been most successful in France. An Oriental species, *P. serotina*, or *sinensis*, which grows wild in Asia and is cultivated in China and Japan, is sometimes crossed with the common pear to produce hybrids whose fruits are excellent for tinning and cooking.

Culture. Standard varieties of pears are produced by the process of budding on seedlings of the European and Oriental species, while dwarf forms are obtained by use of the quince as stock (see GRAFTING). These latter grow from 12 to 15 ft in height and bear earlier than standard varieties, often producing a superior fruit of large size. Trees

of standard varieties do best in a well-drained clay loam, but a light, sandy soil is preferable for hybrids or dwarfs. Standard trees are set 20 to 25 ft. apart each way, according to size. Pears need to be planted in quantity to ensure fertilization; they grow best in a position open to south and west and sheltered on north and east, and are less adaptable than apples with regard to soil and situation. Pears for keeping should be picked a little before ripe and stored in a cool place.

A serious disease of pears is known as *pear scab*, since it spots the fruits. It is controlled by spraying with Bordeaux mixture or lime-sulphur.

Food Value. Fresh pears have a high percentage of water—84.4 per cent—and contain 14.1 per cent of carbohydrates and small amounts of protein and fat. They are wholesome and laxative. Dried pears have a carbohydrate content of 72.9 per cent, and the tinned fruit of 18.0 per cent.

PEARL. A small lustrous drop of shelly substance, classed as a gem, but differing entirely from the precious stones in origin. Pearls are produced by



PEARS

Photo Australian Trade Publicity

oysters, clams and other molluscs. The smooth, iridescent lining seen on the inside



LANDING PEARL SHELL

The Australian pearl fishing grounds occur from Cape York to Shark Bay, a distance of over 3000 miles on the north and west coasts. Usually diving apparatus is used, but here in Shark Bay the shell is dredged.

Photo Australian Trade Publicity

of a mollusc shell is the secretion of the animal within. It sometimes happens that a grain of sand, the egg of some minute sea animal, or other substance becomes lodged



"WINE DRINKER"

Miniature made from Baroque pearls, now in the Green Vault, Dresden.

Photo: German State Railways

inside the shell, irritating the soft body of the occupant. In order to protect itself, the shell-fish proceeds to cover the object with layers of mother-of-pearl, and in so doing it may produce a gem of great value. See OYSTER.

Structure and Characteristics. Pearls are composed of a horny organic substance called *conchiolin*, and two crystalline forms of *calcium carbonate*, with 2 per cent of water. The solid materials are formed in very thin light layers that partly transmit and partly reflect light. Overlapping of successive layers gives some pearls an exquisite iridescence or play of colours. The finest pearls are white, creamy, or a delicate rose-pink, and have a satiny sheen. Black pearls also occur, and are considered valuable because of their novelty and rarity.

In regard to shape, perfectly round pearls are the most valuable, followed, in order, by those of drop or pear shape, oval-shaped gems and button shapes. Of less value are irregu-

lar pearls, known in the trade as *baroque pearls*. Pearls are sold by a special unit of weight called the *pearl grain*, which is slightly lighter than the avoirdupois grain. In general, the value increases as the square of the weight; a fine large pearl costs four times as much as a pearl half its weight. Pearls are soft, easily scratched or harmed by acid, and are subject to decay.

Fisheries. The chief fisheries are off the coast of Ceylon, in the Persian Gulf, among the Polynesian Islands, in the Sulu Archipelago, along the northern and western coasts of Australia and off the coast of Lower California. The Persian Gulf is particularly famous for its fine pearls. The pearl oyster lives at a depth of from 8 to 20 fathoms, and is found in the greatest numbers in the channels dividing groups of islands, where there is a strong, dredging current. The diver goes to the bottom armed with a net of rope for scooping up the shells. The shells so collected are unloaded from boats on the sand, and allowed to lie until the molluscs have decomposed. They are then washed in sea-water, and the hunt for gems begins.

Cultured Pearls. In 1894 Kokichi Mikimoto, a Japanese, devised and patented an improvement upon a method of producing pearls which the Chinese had used for centuries. He fastened a tiny seed pearl to a bit of living oyster tissue, and by a very skilful operation inserted it into a living oyster. He then placed the oysters thus treated in cages and returned them to the water. It takes about seven years for the pearls to form, and the percentage of valuable ones is small.

Imitation Pearls. *Orient essence*, or *pearl essence*, a substance made from the scales of



CULTURED PEARL

Photo: Photopress

certain fish, makes possible the world's enormous "imitation-pearl" industry, for it gives to beads of ordinary glass an authentic

pearly lustre. When the beads are hollow glass, the essence, a pale greyish dust of ground scales, is mixed with gelatin and used to coat the inner surface, after which the bead is filled with wax to give it weight. When a solid glass bead is used, as in the finer imitations, the coating is applied on the outside with an airbrush or by dipping, and the bead is polished. See GEMS.

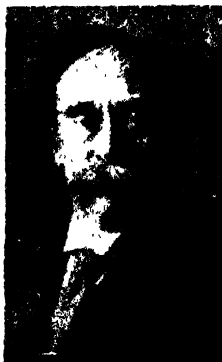
PEARL SPA. See DOLOMITE.

PEARSON, CYRIL ARTHUR (1866-1921). This great newspaper proprietor founded *Pearson's Weekly* and the *Daily Express* and controlled the *Evening Standard*. His sight weakened and, after his retirement in 1910, he went completely blind. His energy and his wealth were then lavished on work for the blind. He became President of the National Institution for the Blind and he turned his house, St. Dunstons, Regents Park, into a hospital for soldiers blinded in the World War. He was keenly interested in training the blind in work for their own support. He was created a baronet in 1916.

PEARY, ROBERT EDWIN (1856-1920). An American Arctic explorer, famous as the discoverer of the North Pole. In 1891 he set out

in charge of an expedition; and others in 1893-1895 and 1896-1897 resulted in important gains for science.

On one expedition the northern coast of Greenland was surveyed, and a latitude of 84° 17' 27" was reached, the highest till then attained in the western hemisphere. The most important geographical knowledge gained from these explorations was the fact that



ROBERT E. PEARY
Photo: Brown Bros.

Greenland is an island.

In 1905 Peary set out in the *Roosevelt*, a ship built for the purpose. He reached latitude 87° 6', thus establishing a new "farthest north" record. A second expedition in the *Roosevelt* was undertaken in 1908, which was successful in reaching the pole on 6th April, 1909. See POLAR EXPLORATION.

PEASANTS' REVOLT. See RICHARD II OF ENGLAND.

PEASANTS' WAR. A name given to the rising of the peasants in Central and Southern Germany in 1524-1525; sometimes called the GREAT PEASANTS' WAR, to distinguish it from other struggles of similar character

which preceded it. The cause of these various risings was the desperate condition of the lower classes, but the immediate occasion of the outbreak was the spirit of revolt engendered by the Reformation, although the new religious leaders supported the authority of their princes.

The peasant forces were without leaders or organization; irregular bands gathered and went about pillaging, burning castles and committing many other excesses. As soon as they were set upon by a regular army, they were reduced to submission, and the revenge which was taken on them was as frightful as their own earlier cruelties had been. According to authentic accounts, about 150,000 persons were killed.

PEAT. Peat is no more than coal in the making; both are valuable fuels produced by the decay of vegetable matter. The plants which formed the peat beds of the world grew in bogs where there was standing water, and their development began in ages long past. As these plants branched and intertwined, they formed a thick mat on the surface of the marsh, causing the lower portions of the stems to die. The decaying vegetation sank lower and lower as the surface growth continued, forming a compact mass that would have turned into coal if there had been sufficient heat and pressure. Deposits near the surface are usually brown, those farther down are black, as they are more nearly decomposed. The latter form of peat looks like wet, black clay. In the northern hemisphere, the vegetation of the peat bogs consists chiefly of mosses, but rushes and similar aquatic plants formed the deposits of the southern hemisphere. It is supposed that peat forms at the rate of about 1 inch a year. There are large peat areas in moorlands of the British Isles, and especially in Ireland, as well as over most of Europe, except the south, and in North America.

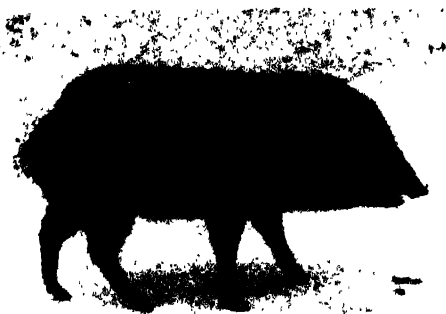
Uses. To make peat a suitable fuel, it must be drained of its water content, which is sometimes nine-tenths of the weight. Peat is burned in the homes of thousands of Irish peasants, and on the Continent it has been a domestic fuel for centuries. Various machines have been made for digging and grinding the raw material, moulding it into blocks of desired size, and spreading these out to dry in the air. At best, peat has about two-thirds of the heating value of coal.

Brown peat, which is light and a good absorbent, is made into an excellent bedding for horses and cattle, and dried, powdered peat mixed with crude molasses is a stock food much used in Europe. Black peat, in which there is considerable nitrogen, is used as a fertilizer, or as a filler for chemical

fertilizers. The fibres obtained from shredding peat prepared for stable litter are now being utilized in making paper, and as stuffing for upholstered furniture and mattresses. Charcoal obtained from compressed peat is valued as a fuel in iron smelting.

PECAN, *pe kan'*. A North American forest tree of fine proportions, belonging to the hickory genus in the walnut family. The fruit of the pecan tree is a rounded oblong nut, of good flavour.

PECCARY, *pek' a re*. One of a group of animals similar to the smaller breeds of wild pigs. There are two main species known—the common *collared peccary*, found in almost all parts of South America and the southern part of the United States, and the *white-lipped peccary*, peculiar to Guiana, Brazil, Peru and Paraguay. The collared peccary is about the size of a young pig, and has a



COLLARED PECCARY

Photo: Bond

greyish, bristly coat and a narrow strip of white around its neck. The white-lipped is considerably larger, of a darker-grey colour, and is characterized by its white mouth and nose. Peccaries differ from domestic swine in being practically tailless, and in the possession of a gland opening on the loins at the back, which secretes an ill-smelling oil and which must be removed as soon as the animal is killed, to prevent tainting of the flesh.

The common peccaries live in thickets and swamps. Their food is largely vegetable matter, although they also eat reptiles; their most common enemy is the puma. They are hunted with dogs, and fight savagely when at bay. Their flesh is inferior to that of the domestic pigs.

Scientific Names. Peccaries belong to the family *Suidae*. The scientific name of the collared peccary is *Dicotyles tajacu*. The white-lipped is *D. parvi*.

PECTIN, *pek' tin*. A neutral substance (one neither acid nor alkaline) found in most fruits and some vegetables. Belonging to the carbohydrate group of foodstuffs, it has

the property of thickening or stiffening a mixture with which it is cooked. The amount of pectin varies greatly with the ripeness of the fruit, and certain fruits are richer in this substance than others. It is most useful for making jelly from fruits which are lacking in pectin.

Commercial pectins, made by concentrating fruit juices rich in pectin, are being marketed. It would be difficult to make a firm jelly from peach and strawberry fruits alone, but with the addition of commercial pectin, excellent results are obtained. See **JELLY**.

PECTORAL ARCH. See **SKELETON**.

PECTORAL MUSCLES. See **ARM**.

PEDIMENT. In architecture, the triangular space on the end of a building having a low pitched roof. It is bounded by the end rafters and a line joining their bases, or the cornices. In modern terms, a pediment is a low gable. Pediments are sometimes ornamented with sculpture when used on stone buildings, the finest of ornamented pediments were those of the Parthenon. In medieval, classical and in modern architecture, doorways, windows and niches are often decorated with forms which resemble, and are called pediments.

PEDOMETER, *pe dom' e ter*. A small instrument resembling a watch, which measures the distance a person has walked.

PEDRO. The name of several Portuguese rulers. See **PORTUGAL (History)**.

PEDRO II (1825-1891). The last Emperor of Brazil, known best as **DOM PEDRO**. See **BRAZIL (History)**.

PEDRO THE CRUEL, KING OF CASTILE (1333-1369). Turned off his throne in 1366 by his half-brother, Henry of Trastamara, for a succession of murders, Pedro fled to Bordeaux to the court of Edward the Black Prince, who marched into Spain and reinstated him. Pedro, who treated the English with black ingratitude, was later dethroned and slain by Henry and Bertrand du Guesclin. See **EDWARD THE BLACK PRINCE**.

PEEBLES. A south-central county of Scotland, with an area of 226,899 acres and a population of 15,053 (1931).

Physical Features. The whole shire falls within the hilly area of the Southern Uplands, and with the exception of a small area in the north-west is principally pastoral country. Apart from a narrow strip bordering the valley of the Tweed, the entire county exceeds the 500 ft. contour, whilst more than a quarter exceeds the 1000 ft. contour. Three roughly parallel divisions may be traced. There is the high ridge which falls on and north of the Selkirk boundary. Broad Law, 2754 ft. and Hartfell, 2651 ft. are only two of several peaks. This highland area

falls away to the valley of the Tweed, which cuts the county in half from its source to near Galashiels. North of this is a less well-defined highland region (Moorfoots, etc.) exceeding 2000 ft. on the Midlothian boundary (Blackhope Scar 2136 ft.) and also on the Selkirkshire march (Windlestraw Law 2161 ft.). Finally, there is a small area in the north-west of relatively level ground with a mean elevation of about 700 ft.,

taries are the Lyne, Eddleston and the Leithen Waters, all on the north bank.

History and Antiquities. From the fact that eighty-three prehistoric hill-forts are reported to have been discovered, it is concluded that this part of the uplands was an important centre of early British culture. The most interesting hill forts are those on Cademuir and Harehope. The round barrow, of a still earlier civilization are numerous in



FISH HATCHERY, PEEBLES

Here are bred the trout for stocking the Tweed.

Photo: Scottish Travel Association

forming part of the valley between the Pentland and the Moorfoot Hills. West of this are the outliers of the Pentlands (East Cairn Hill, 1839 ft.).

Everywhere the hills are rounded, with heather or grass, moorland being confined to the highest slopes, where also peat bogs are numerous. Timber is sparse, except in the eastern part of the Tweed Valley. The valleys are relatively shallow and lack the definition of the Western Highlands. The very fertile valley of the Lower Tweed is highly cultivated, and is more akin to the lowlands in scenery. The course of the Tweed is north-east from its source at Tweedswell as far as the town of Peebles, then south-east until it reaches the county boundary. The most important of its tribu-

the valley of the Lyne. That Peebles formed part of the Roman Province is shown by the Roman camp at Lyne, which is the remnant of a military station. Nearby, traces of a Roman road have been discovered.

The deeds of Wallace and Simon Fraser are intimately connected with the county. Later, from the thirteenth century onwards, Peebles formed part of the Middle March, and until the Act of Union, was governed under the border laws. During the Civil Wars feeling was strongly Parliamentary, and men were raised to fight against the Royalist cause. Neidpath is one of the most picturesque ruined castles and dates from the twelfth century. Tinnis Castle is of the fourteenth century, and once had four round towers.

Agriculture and Industries. Despite the semi-mountainous character of the county, agricultural pursuits rank first in importance. About 75 per cent is rough, undeveloped pasture land, including heaths of large dimensions. Rather more than one-tenth is arable, and a slightly smaller area is laid out in permanent grass. The woodland area covers

mills in the county. From its position on a picturesque stretch of the Tweed at its junction with the Leithen Water, with hills rising more than 1800 ft. in the immediate vicinity, it has acquired additional prosperity as an inland watering-place.

PEEBLES. A Borough and the county town of Peeblesshire, with a population of 5853, situated in the Southern Uplands of Scotland on the River Tweed at its junction with the Eddleston Water. It is now purely a market-town and an inland holiday resort, noted for excellent golf and fishing. On the surrounding hills there are numerous British encampments. At Lyne there are traces of a large Roman camp. In the medieval period, Peebles gained great prosperity by the establishment of a monastery during the reign of James III. The most important antiquity is the Old Cross Kirk, a picturesque ruin which is reputed to contain the relics of Saint Nicholas. It was founded in 1261, and not until 1784 did the building finally fall into disuse. The market cross is probably of fourteenth-century origin. The most important building in the immediate vicinity is Neidpath Castle, the ancestral mansion of the Fraser family.



RIVER TWEED NEAR PEEBLES

The "Dookit Rock" is on the far side of the river.

Photo: Scottish Travel Association

roughly one-twentieth of the whole. The principal cereals are oats and barley; potatoes and turnips are the chief root crops. The tendency of the present century is for an increasing acreage to be withdrawn from arable and turned into pasture. The sheep on the hill walks are of the Blackfaced or the Cheviot breeds. The former predominate and pasture on the heather-covered hills, while the Cheviots are on the more grassy ones.

The only considerable manufacture is that of woollen goods. Cheviot tweeds (originally a corruption of Twel) are well known for their texture and durability. The principal woollen mills are situated in the neighbouring county of Selkirk, but Peebles itself is an important centre. The importance of mining has diminished. Lead, coal and gold have all been produced at various times in the past, but to-day the only product of value is the sandstone found in north-west Peeblesshire, and the whinstone used for rough building and road making. A special sand lately discovered in the northern part of the county may prove of value.

Principal Towns. The county town is Peebles (which see). The only other Burgh is *Inverleithen* (population in 1931, 2359). Here are situated some of the largest woollen

PEEL. See MAN, ISLE OF

PEEL, SIR ROBERT (1788-1850). One of the foremost English statesmen of the first half of the nineteenth century. He was born near Bury, in Lancashire, and educated at Harrow and Christ Church, Oxford.

Peel entered Parliament as a Tory for the pocket borough of Cashel when but 21 years of age. In the next year he was made Under-Secretary for War and the Colonies, and in 1812, at the unprecedentedly early age of 24, became Chief Secretary for Ireland. During his term of office he established the Irish Constabulary, known afterward as "peelers."

Meanwhile, Peel had come to be regarded as an authority on financial affairs, and served in 1819 as chairman of a commission which brought about the resumption of specie



SIR ROBERT PEEL
(National Portrait Gallery)

payments. In 1822 he became Home Secretary in Lord Liverpool's government, and though he resigned in 1827, when Canning formed a Ministry, he resumed his former office in 1828 under the Duke of Wellington. He now became convinced of the necessity for Catholic Emancipation, and was responsible for the passage of this measure through Parliament. In 1829 he organized the London police force, whose popular name of "bobbies" was derived from Peel's first name.

When Peel retired from office in 1830, he was regarded as one of the chief opponents of the Reform Bill, which held public attention for the next few years. For a brief period in 1834-1835, he was Prime Minister, but remained chiefly in opposition until 1841, when, as the leader of the Conservatives, he was called upon to form a government. At the opening of his Ministry, he was pledged not to bring about the repeal of the Corn Laws, yet that very measure was the central feature of his administration (see CORN LAWS). A famine in Ireland made conditions there desperate, and Cobden so pressed his Anti-Corn Law agitation that Peel at length exclaimed, "Let them answer him who can; I cannot"; and forthwith set himself to bring about the repeal of the obnoxious laws. In 1846, after repeal was carried, Peel retired, having brought about a reduction of the tariff and a revival of the income tax, to make good the temporary loss of revenue. During Lord Russell's Ministry, Peel was a firm supporter of the Free Trade principles which once he had decried; he also lent his aid to an attempt to abolish the political disabilities of the Jews.

Peel had, in the course of his official life, changed his views on most of the great questions brought up for settlement, not because he was vacillating or inconsistent, but because he could not conscientiously refuse to take what he had come to think necessary steps. The nation has rarely had a Minister whom it trusted more thoroughly.

PEELE, GEORGE (1558?-1597?). Dramatist and poet. The best of Peele's plays are *The Arraignment of Paris* and *David and Bathsheba*, both of which are more remarkable for their passages of tender and delicate poetry than for their strictly dramatic qualities. As a poet he has an exquisite ear for melody and rhythm. His qualities may be seen at their best in such lyrics as *Fair and Fair*, and *Twice so Fair*, and in some of the blank verse passages of *David and Bathsheba*.

PEERAGE. The word *peer* (from Latin *par*) really means "equal," but in English usage it refers to members of the *peerage* or nobility, who are all equal in that each is entitled to a seat in the House of Lords, and

has a voice in all legislation there debated. In England the peerage dates from the Norman Conquest. Previous to that time, the government was in the hands of a *witenagemot*, or parliament, composed of notable men without titles.

After the Conquest in 1066, the country became practically the property of William I, who proceeded to divide it among his followers. The men to whom he distributed land became barons, or direct tenants-in-chief of the King, to whom they were bound to render certain services. Such men were *king's men*, and could be summoned to the King's court to advise and take active part in the government of the country. Included among those who attended the King's court were bishops, abbots, priors and barons.

The hereditary peerage was of gradual growth, for the grants of land made by William I were not always intended to be passed on from father to son or next heir. However, it became customary, on the death of a baron, to install his son in his place and confirm his position by calling him to the King's court—the origin of the present Parliament. The King held his crown by hereditary right; the peerage assumed the same right and soon established the precedent.

The more powerful of the barons assumed the title of earl, a term which had implied high dignity under the Saxons, and until the reign of Edward III, the peerage consisted only of earls, barons and ecclesiastics, the latter representing the Church. In 1337 the Black Prince was created Duke of Cornwall, thus bringing a new title, that of duke, into the peerage. In 1385 Richard II added the title of marquess, previously unknown. Still another addition was made by Henry VI, who created John Beaumont a peer with the title of viscount. Ecclesiastical peers were gradually eliminated, but at the present time the Archbishops of Canterbury and York, the Bishops of Winchester, London and Durham and twenty-one other bishops of the established Church of England take seats in the House of Lords as *Spiritual Peers*, their titles not being hereditary.

To further the judicial strength in the Lords, an Act was passed in 1876 authorizing the creation of two Lords of Appeal in Ordinary, and making provision for the appointment of two more as certain judicial vacancies occurred. Their dignities lasted for life only, and they were to sit and vote in Parliament only so long as they held their judicial offices. Since 1887, all retired Lords of Appeal may sit and vote as members of the House of Lords for life.

The grant of a peerage is made by letters

patent issued by the Crown, whose prerogative is limited. The King is not limited as to number of United Kingdom peerages, but the Act of Union of Scotland prevented any increase in the number of Scottish peerages, there being now eighty-seven Scottish peers. Of these, fifty-one hold United Kingdom peerages and have seats in the House of Lords, with sixteen representative Scottish

barons, given in order of their rank, each title being hereditary and carrying with it certain honours and dignities, and also legislative privileges, which, however, can be exercised only in and directly connected with the House of Lords. It is clearly laid down by English laws and customs that the children of peers, although receiving courtesy titles, such as *Lord*, or *The Honourable*, are yet commoners, and as such are entitled to no privileges not enjoyed by the humblest citizens.

When a peer is accused of treason or a felony, he has the right to be tried by his peers. If Parliament is sitting, the trial takes place before the assembled House of Lords, if Parliament is not in session, the Lord High Steward calls twelve or more Lords to hear the case. The last trial of a peer by Parliament was the charge of manslaughter against Lord de Clifford in 1935, but this right it is now proposed to abolish.

PEEWIT. See LAPWING.

PEGASUS, *peg' a sus*. A winged horse of ancient Greek mythology. The earliest legend connects his birth with Medusa, the hideous Gorgon whose head was cut off by Perseus. As blood from the head trickled into the earth, it produced the winged horse. Athene caught and tamed him, according to one story, and brought him bridled to the hero Bellerophon. Another story says the horse often came to drink at the fountain of Pirene, and here Bellerophon, bearing the golden bridle given him by Athene, found the animal grazing. At the sight of the bridle, Pegasus yielded himself captive and bore his master away to his successful battle with the Chimaera. Bellerophon, however, aspired presumptuously to fly to heaven, and Pegasus, throwing him, flew away to the skies and was

turned into the constellation that bears his name.

Later legends connect Pegasus with Mount Helicon, which started to rise to heaven when enchanted by the song of the Muses. Pegasus stopped its ascent by a blow of his hoof, and where he struck the ground, there gushed forth the fountain Hippocrene, sacred to the Muses.

PEIPING, *pay' ping*. The official name for Peking, China, after 1928.

PEKING, *pe king'*. The capital of China for a thousand years. When, in June, 1928, the seat of the Nationalist government was moved to Nanking, the government adopted



HOUSE OF LORDS

When assembled in Parliament, the Peers, together with the Lords Spiritual, form the highest court of judicature in the Realm. They form also a permanent council of the Crown.

Photo: U. & U.

peers, leaving twenty without seats. The Irish peerage has 175 members, of whom twenty-eight are elected to sit in the House of Lords for life (no more are being elected until further notice), while eighty-two sit as peers of the United Kingdom. See PARLIAMENT—House of Lords.

The Prime Minister usually recommends the creation of new peerages, and by far the greater number of creations for the past two centuries have been rewards for political services. Women may hold peerages either by inheritance or creation. The peerage is now confined to princes of the Royal blood, dukes, marquesses, earls, viscounts and



PEKING

1. Marble Bridge in the grounds of the Summer Palace. 2. Entrance to the Legation Quarter.
3. Chinese troops marching down a main street.

Photos: OROC; U. & U.

the name PEIPING (pronounced *pay' ping*) for the old capital.

Peking lies in a sandy plain, about 12 miles west of the Pei-ho (White River), 100 miles from the Gulf of Pechihli, and 70 miles south-east of the Great Wall of China. It is surrounded by a massive wall, cut by sixteen gates. This outer wall, surmounted by many lofty square towers, varies from 30 to 50 ft. in height, and is about 25 ft. thick at its base. It encircles an area of 25 sq. miles. The top is paved like a roadway.

Highways radiate to the chief cities of the province, and as modern railway communication has developed, Peking has main-

tained its place as a centre of transport and distributing point for the products of Mongolia and Northern China. Of late years many improvements on Western lines have been made in the city, though it still retains a mediæval aspect with its innumerable towers, pagodas and temples.

Peking is made up of five walled districts, three of which are concentric. The Forbidden City, the old home of the Emperor, is in the middle, cut off from the rest of the city by a wall and moat. Around it lies the Imperial City, former home of the lesser members of the Court. Outside of this is the North or Tartar City, surrounded by a wall 41 ft.

across at the top. The South, or Chinese City, adjoins the old Tartar City on the south. The Legation Quarter, the home of official representatives of foreign countries, is a small district in the southern part of the North City. The administration of the Quarter is entirely in the hands of the diplomatic corps, who pass their own regulations and maintain their own force of Chinese police.

The Forbidden City. The Forbidden City, surrounded by a deep, wide moat, and enclosed by a wall of bright-yellow tiles, was guarded by many soldiers; only Chinese who had official connection with the Court might pass the gates. In these precincts is the Hall of Highest Peace, where the Emperor held his levees on New Year's Day, his birthday, and on other State occasions. Just beyond is the Palace of Heavenly Purity, the Emperor's former dwelling and the most magnificent of all the palaces. Among other notable buildings in the walled enclosure is the Hall of Intense Thought, where sacrifices were offered to Confucius and other sages. All these are now open to the public.

Imperial City. This district is oblong in shape, with a gate in each of its four walls. Here stands the Great Temple in which the Emperor and the members of the imperial retinue worshipped their ancestors. Near by is Prospect Hill, 150 ft. high, crowned with five Buddhist temples. It is separated from the Forbidden City by a moat crossed by marble bridges. Here is to be found the Temple of Great Happiness, dedicated to Yuan Fei, the discoverer of the uses of the silkworm.

History. The history of Peking covers more than three thousand years, the records showing that in 1211 B.C. there was a city on the site of the present Peiping, which is the sixth city built on the same site. In 1264 the great Kublai Khan made it his capital and built the present Tartar City. The city was occupied by the Manchu conquerors in 1643. In 1860 it was surrendered to the English and French allies (see CHINA), which led to the establishment of the various foreign legations in the Inner City. Japanese influence has increased in recent years to something approaching a protectorate. According to a census taken in 1927 under direction of the Metropolitan Police Administration, Peking and suburbs had 1,297,718 inhabitants.

PEKINGESE, pek in ees', DOG. A toy spaniel of Chinese origin which has lately become a popular pet in Western countries. The origin of the breed is lost in antiquity, but it is known that these dogs were regarded as sacred and kept closely guarded in the palaces of the Chinese rulers for many

centuries. In 1860, at the time of the looting of the Summer Palace in Peking, five of the dogs were seized in a part of the garden frequented by the Emperor's aunt, and carried to England; these became the progenitors of the Pekingese of to-day.

A standard dog is described as follows: head with broad skull, flat between the ears, wide between the eyes; nose black, broad and flat; eyes large, prominent and lustrous; ears heart-shaped, set fairly high; muzzle short and broad, wrinkled; tail



PEKINGESE
Photo: Wide World

curled and carried well up on the loins. The coat is long, flat, rather coarse, but with soft and profuse feathering on the thighs, legs, tail, and feet. The Pekingese may be red, fawn, black, sable, brindle, white, black-and-tan or parti-coloured. The largest specimens weigh 18 lb.; the smallest less than 5 lb.

PELAGIC, pe laj' ik. Fishes or the eggs of fishes are said to be pelagic if, in the case of the former, they are of surface or near-surface living habit, and of the latter, if they float near the surface.

PELAGIUS, pe lay' jius. A fifth-century monk of Welsh origin (the name being a Latin rendering of Morgan, "sea-born"), who was the author of the heresy known as Pelagianism. Pelagius was already in high repute as a scholar and saint before he went to Rome about A.D. 400, and there, five years later, he made public his views on original sin and free will. According to his doctrine, there was no original sin, and consequently no necessity for baptism. He asserted the existence in man of complete free will, which was sufficient, even without divine grace, to enable him to attain to salvation. He denied that the consequences of the fall of Adam were visited upon posterity. Though Pelagianism appealed to men of rationalist views within the Catholic Church, it did not

lead to the establishment of a separate sect. The controversy was at its height during the fifth and sixth centuries, and Saint Augustine took up a position in strong opposition to the heresiarch.

In his teaching, Pelagius was associated with Celestius, an Irish monk. They left Rome in 410 on the approach of the Gothic invaders, and settled in Carthage. There, and subsequently at Rome and Ephesus, Celestius was condemned for heresy. In 418, Pelagius was banished by the Emperor and probably returned to Wales.

PELARGONIUM. See GERANIUM.

PELÉE, *pè lah'*, MONT. A volcano whose eruption in 1902 was one of the most calamitous of modern times. See MARTINIQUE.

PELEUS, *pe' lūs*. The father of Achilles. See ACHILLES; ERIS.

PELHAM, SIR HENRY (1696-1754). The younger son of Lord Pelham held various portfolios under Walpole; he had much of his chief's financial ability, but little force of character. He became First Lord of the Treasury in 1743, but had little control over his Cabinet, which included his elder brother, Newcastle. He felt and showed little zeal in the conduct of the War of the Austrian Succession. He and his brother forced George II to dismiss the able and energetic Cartaret. His Ministry carried out the reform of the calendar in 1752.

See NEWCASTLE, DUKES OF.

PELIAS, *pe' lias*. The uncle of Jason. See JASON.

PELICAN, *pel' ik an*. A large bird with an enormous pouch attached to its grotesque-looking bill, in which it stores small fish

sight to see a young pelican plunge its head deep into the parent bird's pouch and dig out the partly digested food. During the



WHITE PELICAN

Photo. Bond

feeding process, the pouch is pressed back against the breast, which gave rise to the ancient legend that the pelican fed her young upon her own blood, and led to the use of this bird in heraldry and medieval art as a symbol of charity, mother love and self sacrifice.

The pelican is the largest of the web-footed birds. The common pelican is extensively distributed over the Old World, especially in S.E. Europe, and other species are found in Africa, Australia and America. The pelican's nest is usually built on the margin of a lake or shallow river, and consists of a mound of reeds lined with grass. Its eggs are chalky white.

The birds are highly sociable, living in colonies and frequently following a co-operative plan in their fishing.

Scientific Names. The pelican family is known as *Pelecanidae*. The common pelican is *Pelecanus onocrotalus*.

PELION, *pe' le on*. A mountain in Thessaly, Greece, which figures in a celebrated myth. According to the tale, the giants heaped Pelion upon Ossa, another



PELICANS

Photo: U. & U.

which will later be feasted upon at leisure or fed to its young. Both young and old birds have voracious appetites. It is a curious

mountain, in an attempt to reach Olympus, the home of the gods. Pelion was the abode of Chiron, the Centaur, who lived in a cave near the summit. The *Argo* (see ARGONAUTS) was built from wood taken from Pelion's slopes. The mountain lies between Volos (the ancient Iolcus) and the east coast, and its highest point is 5340 ft. above the sea.

The modern phrase, "piling Pelion upon Ossa," means adding difficulty to difficulty.

PELLAGRA, *pel lag' ra*, or *pel lay' gra*. A non-contagious disease, believed to be due to some deficiency in the diet. Pellagra is, or was, prevalent among the poorer classes in Italy, parts of France and Spain, Egypt and the Southern United States. When first studied, it was noted that a one-sided diet, consisting chiefly of fat meat, devitalized cereals, molasses, and coffee, was commonly associated with its occurrence.

Symptoms. The principal symptoms of pellagra include lassitude, disinclination to exert oneself, mental depression, pallor, diarrhoea alternating with constipation, indigestion, and nervousness, along with a bright red skin eruption resembling sunburn, that appears on the face, neck, back of hands, forearms, feet or other parts of the body. The tongue becomes red and inflamed, and a burning sensation is felt down the gullet. The eruption leaves a thickened, roughened skin. Untreated cases often end in insanity.

It is generally agreed that the adoption of a balanced diet containing plenty of vitamin B, and removal from unhygienic surroundings will prevent pellagra.

PELOPIDAS, *pel op' id as* (? - 364 B.C.) A hero of Thebes, associated with Epaminondas. Their united efforts made Boeotia for a time the leading state in Greece. Driven to Athens in 382 B.C. when the Spartan influence became supreme in Thebes, Pelopidas in 379 returned at the head of a determined band, attacked the garrison, and compelled the Spartans to surrender. He then set up a democratic form of government and was for several years at its head. He organized a Sacred Band among the young patriots, and this was of great help to Epaminondas at the Battle of Leuctra in 371 B.C. Pelopidas was killed while fighting against Alexander, a despot of Thebes. See EPAMINONDAS; THEBES.

PELOPONNESIAN, *pel o pon ne' sh'n*, **WAR**. A contest in ancient Greece, waged between Athens and Sparta. Sparta, jealous of the fame of its rival, made use of every opportunity to stir up the Athenian colonists to revolt against the tributes demanded by Athens. Finally, in 432 B.C., when Athens aided Corcyra in a quarrel with its mother city, Corinth, Sparta sent Athens a message that it either must let all the Greek cities go

free or must fight. Athens replied that Sparta should first set free its acquisitions in the Peloponnesus, and when Sparta refused, the war began (431 B.C.).

Sparta's plan was to ravage Attica and stir up revolts among Athenian colonies. The people of Attica, at the advice of Pericles, took refuge within the Long Walls of their city, while the Athenian fleet and army were sent to ravage the Peloponnesian coasts, and thus they avoided meeting the Spartans in open battle. This plan worked well for Athens until a plague fell upon the city and swept away more than one-fourth of the population. Pericles was among those who died, and there was no one capable of taking his place.

The turning-point in the war was the Athenian expedition to Sicily, which ended disastrously for Athens in a great sea fight in the harbour of Syracuse (413 B.C.). In 405 B.C., the last Athenian fleet was destroyed at Aegospotami, and in the next year, the city of Athens surrendered.

See GREECE, PERICLES, SPARTA.

PELOPONNESUS, *pel o pon ne' sus*. The ancient name of the southern peninsula of Greece. In medieval times the region was called Morea, because of its resemblance to a mulberry leaf (genus *Morus*), and it still bears that name. It is separated from the mainland by the Corinthian and Saronic gulfs (the latter now called the Gulf of Aegina), with a connecting link in the narrow Isthmus of Corinth. In ancient days, the Peloponnesus was divided into six districts—Messenia, Argolis, Laconia, Elis, Arcadia and Achaea. Among these states almost perpetual war was waged until the Roman conquest in 146 B.C. See GREECE, PELOPONNESIAN WAR.

Derivation. The name "Peloponnesus" comes from the Greek *Pelops* and *nesos*, meaning the "island of Pelops" (see PATORS, overleaf).



MEDALLION

Issued after the defeat of the Athenians in 413 B.C., the obverse has a head of Athena surrounded by dolphins and the reverse shows Victory crowning a charioteer. Below is a suit of armour. The Athenians' armour was given as prizes in the festival commemorating their defeat.

Photo: British Museum

PELOPS, *pe' lops*. In Greek mythology, the son of Tantalus. Tantalus at one time gave a feast to the gods, and served his son Pelops as the chief dish. The gods, however, recognizing what was set before them, declined to eat, and restored Pelops to life. He married Hippodamia, and was the father of Atreus and Thyestes. The Peloponnesus took its name from him.

PELVIS. A strong bony cavity, lying directly below the abdominal cavity and communicating with it (see ABDOMEN). It holds the organs of excretion and reproduction, and its bony structure serves as a support for the spine and as a source of attachment for many of the large muscles of the back and abdomen. *Pelvis* is the Latin for "basin," a term which aptly describes the shape of this



PELVIS

1. Sacrum. 2. Iliac Crests. 3. Cotyloid cavities.

cavity. The front and side walls are formed by the two hip bones, which are so irregular in shape that anatomists have named them the *ossa innominata*, meaning "bones without a name." In the back is an opening between the hip bones, which is filled in with a triangular bone called the *sacrum*; the sacrum lies below the lowest vertebra and above the *coccyx*, or tip of the spine. On each side of the pelvis is a socket for the articulation of each of the thigh bones. The whole pelvis, thus, is supported upon the two legs. The floor of the pelvis consists of strong muscles and connective tissue.

PEMBROKE AND MONTGOMERY. The founder of the line was Roger de Montgomery, "literally foremost among the conquerors of England." His fifth son Arnulf was created first Earl of Pembroke. Roger was cousin to William the Conqueror, equipped sixty ships towards the invasion of England, and fought in the Battle of Hastings. He is mentioned in Domesday Book as one of the five principal persons in the country. His son Arnulf built the Castle of Pembroke about the year 1090.

Twelve years later he led the rebellion against King Henry I, and married a daughter of Uurchadh, King of Leinster, whose aid against King Henry he secured. In 1138 the Pembroke earldom passed to Richard de Clare, called "Strongbow," made Hereditary Marshal of England. He in 1170 succeeded to the Kingdom of Leinster. In 1189 the then Earl of Pembroke bore the Cross with Sceptre at the coronation of King Richard I, and in 1213 was witness to the Charter granting England and Ireland to the Popes. He was Regent of England in 1216 and Marshal of England at the coronation of King Henry III. His son William succeeded to the earldom in 1219, and was one of the twenty-five Barons who were guardians of the Great Charter (June, 1215). He was then made Receiver of the Exchanges of All England. In 1235 Gilbert Marshall, who married the Lady Margaret, sister of Alexander II, King of Scotland, was in possession of the Pembroke Earldom. He met his death at a tournament. William de Valence, half-brother of King Henry III, was created Earl of Pembroke in 1251; the Plantagenet Humphrey of Lancaster bore the title in 1414; in 1452 it passed to the Tudor Jasper, second son of Owen Tudor and Queen Catherine, widow of King Henry V. William Herbert, who held the title in 1468, was beheaded in the following year, and in 1478 the title passed to Edward Plantagenet, eldest son of King Edward IV. He was also created Earl of Chester, Prince of Wales (26th June, 1471) and Duke of Cornwall (17th July, 1471), and succeeded to the Crown as King Edward V on 9th April, 1483. Anne Boleyn, one of King Henry VIII's wives, crowned Queen of England, 1st June, 1533, and beheaded 19th May, 1536, was also Marchioness of Pembroke. Since 1551 the Earldom has been held by the Herberts. The present Earl is Reginald Herbert, also Earl of Montgomery, Baron Herbert of Cardiff, Baron Herbert of Spurland in the Isle of Sheppey, and Baron Herbert of Lea. He is Hereditary Visitor of Jesus College, Oxford. In the World War he served with distinction. His son and heir, who was born in 1906, has been Equerry to the Duke of Kent since 1935. The first of this line was William Herbert, created Baron Herbert of Cardiff, 10th October, 1555, and Earl of Pembroke. He married Anne, sister of King Henry VIII's last wife.

PEMBROKESHIRE. The most westerly county of South Wales, with an area of 393,003 acres, and a population in 1931 of 87,179.

Physical Features. The county is mainly level, with a precipitous and rocky coast, indented by numerous bays and forming



PEMBROKESHIRE

1. Pembroke Castle. 2. Abercastle, near Trevine 3. St. David's Cathedral. This ancient and beautiful church was once the centre of religion in Wales. 4. Trevine

Photos: Taylor

headlands and islands. The long narrow inlet of Milford Haven all but divides it into two parts, from east to west. The only mountains, the Mynydd Prescelly, form a small range in the north, where the greatest height reached is 1760 ft. The principal rivers are the Teifi, which forms the northern border (famous for salmon fishing) and the rivers Nevern and Cleddau, rising in the Prescelly Mountains. The latter soon divides into the Eastern and Western Cleddau, which form two distinct rivers, emptying their waters into Milford Haven, a considerable distance apart. In contrast with the remainder of the county, the river valleys are fertile and provide the best soil, and in some parts produce an almost tropical vegetation. The climate is mild and salubrious, and the rainfall low, especially on the coast, where it is only 30 to 40 in. annually.

History. A rough line drawn east to west through the centre of the county divides the English south from the Welsh north. In the south, settled in the twelfth century by the Flemings, English is spoken and the place-names are English; and the history of the two races since that time is one of harmonious fusion, but rigid division, which has won for South Pembrokeshire the name of "Little England beyond Wales." Of the early history of the county, known as Demetia, or in Welsh Dyfed, little is known. It was certainly conquered by the Romans, though few traces of their occupation remain, beyond coins and a small station near Haverfordwest. In the fifth century the county fell under the dominion of the house of Cunedda, and it is to this house, with the lineage of which Saint David is associated, that the Christianization of the county was due. The remarkable racial division of south and north was begun as early as the fifth century by settlement of Scandinavians, and later carried on by continuing Norman families. The Flemish settlement is usually dated 1107. Haverfordwest became their centre and, in addition to numerous Flemish place-names, they have left their mark in dialect, customs and facial character. The twelfth century, about which we know more owing to the chronicles of Giraldus Cambrensis (a native of the county, born in 1147), is remarkable for the conquest of Ireland, in which Pembrokeshire men played a notable part. To this period belongs, too, the building of the Cathedral at St. David's, and of many famous castles. The turbulent struggles of the fifteenth century between the native Welsh Princes against their Norman overlords, which ended with the supremacy of the Marshals, was followed by a century of peace, which the dramatic rising of Owen Glendower did little to disturb.

The constitution of the county as a shire on the English model by Henry VIII may be said to have closed a medieval palatinate system. Alone in all Wales, Pembrokeshire decided for Parliament in the Civil War.

Occupations and Industries. Fishing and agriculture are the principal occupations, though there is a little coal-mining in the south. The fishing is the most important in Wales, the main port being Milford Haven. Milk, livestock, butter and cereals form the main agricultural produce, more barley being grown than in any other Welsh county. The growing of sugar beet and early potatoes in sheltered valleys is of increasing importance. The flannel industry, once important still survives at Narberth. The South Wales coalfields continue into the county and, until recently, coal was mined and shipped from Milford, but the seams are faulted and mining difficult. The tinsmith and iron and steel industries have finished.

Communications. These are, on the whole, poor. The main Great Western Railway line touches the county at Fishguard with the Irish Mail Express, but apart from this the county is mainly served by branch lines. Though still rough in places the roads have been much improved.

Antiquities. The main interest of the county is formed by its fine castles, which are very numerous, and its distinctive churches. Roman remains are notably few, though there is a small station near Haverfordwest, at Ambleston. The Pembrokeshire Peninsula, west of Fishguard and Goodwick abounds in tumuli and other prehistoric antiquities. Of particular interest is Pictou Castle, at the meeting of the East and West Cleddau; of the thirteenth century, founded by William de Pictou, it has never been dismantled and has been ever since in continuous occupation by the one family. On the south coast are remains associated with Saint David—his mother's chapel near Caerfai Bay, the saint's traditional bathing place, and nearby the ruined Chapel Stunan, the chapel of Saint David's confessor, Saint Justinian. Nearby is the traditional site of the legendary Roman camp of Menestr. The twelfth-century Cathedral at St. David's, a village of some 1500 inhabitants and the smallest cathedral city in the kingdom, is considered the finest church in Wales.

The county seat is—

Haverfordwest, a Municipal Borough with 6113 inhabitants (1931), connected by local railway line with Milford Haven. It is the centre of "Little England." Of the original twelfth-century castle, built by the first Earl of Pembroke, the main walls and the keep remain. There is a thirteenth century

church. The County Assizes are held at the town, which is a busy marketing centre. Haverfordwest occupies the unique position of being the only complete County of a Town in the country. Various charters prior to the reign of Henry VIII had given Haverfordwest County powers, but to make the matter beyond dispute, in the reign of the monarch mentioned an Act of Parliament was passed, reciting that "whereas there had been twelve counties in Wales, there should now be thirteen and the Town of Haverfordwest should be that thirteenth" county. Other counties of towns in Great Britain are deficient in some respect, but Haverfordwest has its own Assizes, its own Quarter Sessions, its own High Sheriff, its own Under-Sheriff, and until recently had its own Lord Lieutenant.

During the eighteenth century Haverfordwest was a leading seaport, and a relic of its importance is the fact that even to-day the Mayor is Admiral of the Port.

Other important towns are—

Pembroke, a Municipal Borough, with a population of 12,008. Originally a walled town, little remains of the walls, but Pembroke Castle on the River Pembroke is remarkable, both for its situation over a natural cavern and for its good state of preservation.

Milford Haven, an Urban District, with 19,116 inhabitants (1931), has lost its importance with the decline of shipping in South Wales. It is now the centre of South Wales fishery, in the Middle Ages and up till the nineteenth century it enjoyed the greater distinction of being a royal dockyard. It is proposed to set up a Government factory on the Haven, supplementary to Woolwich Arsenal.

Tenby Municipal Borough, 4108 inhabitants (1931), is sometimes referred to as the "Naples of Wales." Once a flourishing seaport, and a walled town, it is now a popular seaside resort. Caldey Island, some two miles south of Tenby, has, with interruptions, been the home of monks since the sixth century. There is now a Cistercian abbey on the island.

Fishguard and Goodwick, an urban district with 5240 inhabitants (1931) is the harbour for the Fishguard-Rosslare and Fishguard-Cork Irish mail and cargo service.

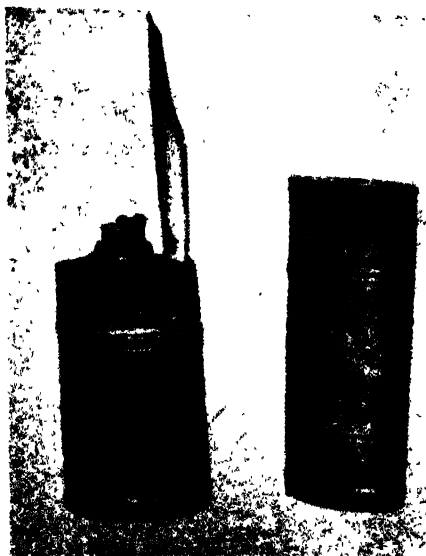
PEMMICAN, *pen'ik an*. A North American Indian name for a food prepared by drying and powdering the lean meat of the buffalo or deer. This was then seasoned with berries and stirred into boiling fat, after which it was dried in cakes.

PEN. Before the invention of the steel pen, various instruments were used for writing. The Romans used a *stylus*, made of bone or metal and pointed at one end, for

engraving characters on tablets of wax. Some people painted letters with a fine brush, as do the Chinese to-day. Pens made from reeds were used for writing with ink on papyrus (which see); later, it was discovered that better pens could be made from the quills of certain birds, such as the goose, the swan, and the crow. The Latin word for quill was *penna* or *penne*, and from this we derive the names *pen* and *penknife*.

Steel Nibs. The manufacture of steel nibs by machinery was begun in England between 1820 and 1830.

Cast steel of the best quality is used; it reaches the manufacturer in the form of thin



POCKET PEN

Quill pen and ink-well over two hundred years old.

Photo: U. & U.

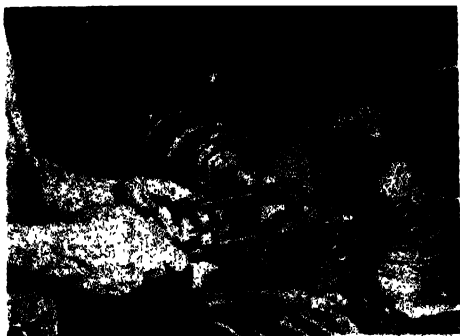
sheets about 6 ft. long and 17 in. wide. The plates are cut into strips which are placed in air-tight boxes and heated to a dull red, then allowed to cool slowly. These strips are then rolled to the required thickness.

Pens called *blanks* are cut from the strips with dies. The hole at the base of the nib, and the lateral slits, are then cut with another die. After a second heating, the pens are rounded into shape in a press. Tempering is done by heating the nibs to a bright red and immersing them in oil, then rolling them in cylinders over a charcoal fire. The nibs and steel holders are polished by rolling them for several hours in a barrel of ground iron, and then in another of sawdust. The points are next ground to make them write smoothly, and finally the slit is cut in the point.

Other Varieties of Pens. Gold nibs, which are made in much the same way as steel nibs, are valued especially because of their durability and flexibility. The expense of manufacture has been lessened by the substitution of iridium for diamonds and rubies in making

The ancient Egyptians discovered that lead would mark papyrus (which see), and they used it for such a purpose many centuries ago. The Romans also knew of this peculiarity of lead, and they made small rods of it which they used for marking and writing. Then a substance that made a blacker mark was found, and it was called *black lead*. This substance was *graphite* (which see), and for a long time it has been used for the "leads" in so-called lead pencils, though it contains no lead whatever.

Manufacture. The ordinary pencil of commerce consists of a tiny rod of graphite mixed with pipe clay and enclosed in a wooden case. When received at the pencil



tips for the points. Such tips are a protection against wearing on the points. Gold nibs are used in fountain pens, which have in the holder an ink barrel that feeds the point automatically. The stylographic pen is a variety of fountain pen in which a needle at the end serves as a valve to release the ink when the point is pressed on the paper.

PENAL SERVITUDE. See IMPRISONMENT.

PENANCE. A sacrament of the Roman Catholic Church (which see).

PENANG, *pen ang'*. See STRAITS SETTLEMENTS.

PENATES, *pen ay' les*. See LARES AND PENATES.

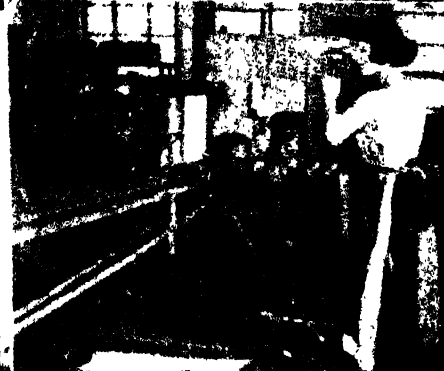
PENCIL. Originally, a stick of lead.



MAKING FOUNTAIN PENS

Top: Shaping the barrel to make room for the lever. *Centre:* Polishing caps and barrels. *Below:* Fixing the nib and funnel.

Photos: U. & U.



MAKING PENCILS

1. Grinding graphite into removing polish from

2. Graphite in plastic form being pressed into sticks. 3. Machine for of pencils. 4. Slot grooving machine. 5. Colouring machine. Pencils are 6. Machine for stamping the lettering.

factory, the graphite is ground and separated, according to its degree of fineness, by being floated in water in a series of tanks, so arranged that the water flows from the top of one tank to the next below it. The coarsest graphite settles in the first tank, the next grade in the second, and so on until the finest grade is reached.

The several grades of graphite are used in pencils of varying fineness. Equal parts of clay and graphite make a hard pencil. An ordinary pencil has seven parts clay to ten parts graphite. A soft pencil has a still larger proportion of graphite.

The wood of the cheaper kinds of pencils is pine; in the better kinds it is red cedar and redwood. It is first grooved, and the strips of lead laid in the hollow; another piece is then glued upon this and the whole is rounded in a special machine.

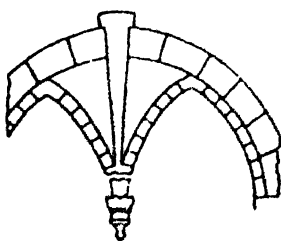
The leading countries in the manufacture of lead pencils are Germany, England, and the United States.

Other Pencils. Slate pencils are made of soft slate and may be incased in wood, but most of them are small rods of slate. Coloured pencils are made by mixing colouring-matter with clay or wax and enclosing the pencil in a wooden or a paper case. Pencils for marking on crockery or glass are made of wax, coloured with lamp-black or ivory black.

Pencils with a case of metal or bakelite and a means for propelling the lead have come into wide use.

PENDA. A king of Mercia (which see).

PENDANT. In architecture, an ornament hanging from the ceiling or the pillar of a building. Pendants usually hang from vaults or domes, but in wooden buildings, they may hang from the rafters or girders. In some buildings having the roof supported by arches, they hang from the arches.

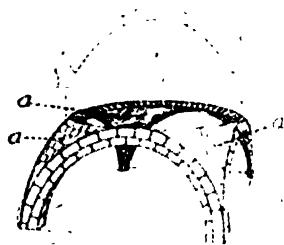


PENDANT

Pendants constituted a special feature of ancient Oriental architecture, especially that of the Indians, Persians and Saracens, who used richly carved stone. They were introduced into Europe in the Middle Ages.

PENDENTIVE, *pen den' tiv*. The triangular segment of an hemispherical dome, formed by arches extending from the four pillars upon which the dome rests to the circumference of the circle formed by cutting off, as it were, the top of the dome. From this smaller circle as foundation,

the highest part of the dome rises. The pendentive, derived no doubt from similar structural expedients in Sassanian Persian architecture, became one of the chief characteristics of Byzantine architecture. Excellent examples of this feature are seen in the mosque of St. Sophia, Constantinople.

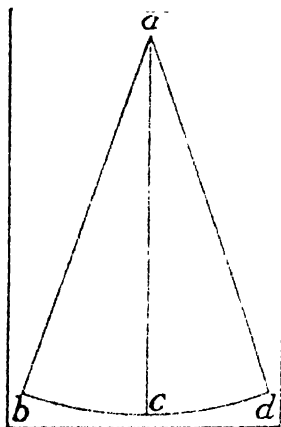


PENDENTIVES
(a) Pendentive. Dotted lines show completion of super-structure

PENDULUM. A weight so suspended as to swing freely in response to the pull of gravity.

The movements of the pendulum to and fro are called *vibrations*, or *oscillations*, and the path it traverses is called the *arc*. The time occupied in passing over this arc is the *period* or *time* of vibration or oscillation.

In Fig. 1, the motion of the pendulum from *c* to *b* or from *c* to *d* and back again to *c* is a *single vibration*; the motion from *c* to *b*, across to *d*, and then back again to *c* is a *double vibration*. The *amplitude* is the arc *b c* or *c d*, or the angle *b a c* or *c a d*. Since the pull of gravity is greater at sea level and at high latitudes (the acceleration of gravity increases from the equator toward the poles, and decreases from sea level upward), pendulums vary, as to time of vibration, according to situation. The shorter the pendulum, the more frequent are the vibrations, if the amplitude remains the same.



There are four laws of the pendulum, stated as follows—

1. The time of vibration is independent of the mass.
2. In the same pendulum, all vibrations of small amplitude are made in the same time.
3. The time of vibration varies directly as the square root of the length. A pendulum one-ninth the length of another will vibrate three times as fast.

4. The time of vibration varies inversely as the square root of the acceleration, or force of gravity.

In general, the time of vibration decreases

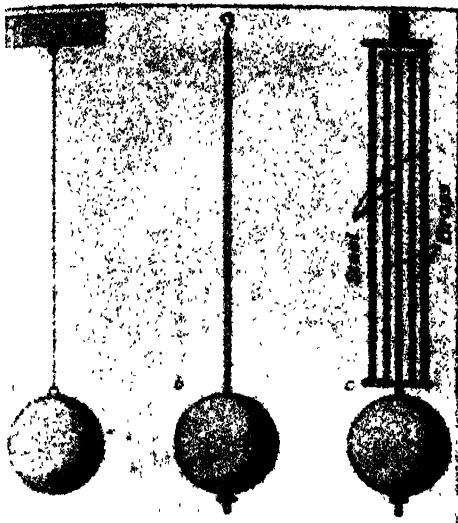


FIG. 2

as the pendulum is moved from the equator toward either pole.

The simple or ideal pendulum, a weight suspended from a thread (shown in *a*, Fig. 2),

could not be used for a clock, because the thread would not be stiff enough to set in motion other portions of the mechanism. A practical pendulum, therefore, is usually of the form shown in *b*, Fig. 2, it consists of a flattened bob supported by a rod, with a screw beneath the bob to adjust the length of the pendulum. The pendulum is lengthened when the clock runs too fast, and shortened when it runs too slow.

Since the rod in a clock pendulum tends to expand in summer and shorten in winter, clocks known as *regulators* are supplied with so-called *gridiron* pendulums, consisting of several brass and steel rods so attached that some expand upward and some downward, thus keeping the mean length constant (see *c*, Fig. 2). In another device, the length is kept constant by the expansion and contraction of mercury in a cup which swings at the end of the rod, in place of the ordinary weight. See **CLOCK**.

PENELOPE, *pen el' o pe*. A Grecian princess who, according to the old legend, became the wife of Odysseus about the same time that Helen, her cousin, was married to Menelaus. During the absence of her husband Odysseus at the Trojan War, Penelope was persecuted by aspiring and persistent suitors, who endeavoured to convince her that the long absence of her husband meant his death. She succeeded in keeping them at a distance and in deferring her decision, telling them that as soon as she had completed a cloth



PENELOPE MOURNING FOR THE ABSENT ODYSSEUS
Terra-cotta bas-relief.

which she was weaving, she would give them an answer; but each night she unravelled what she had woven during the day.

PENEUS, *pe ne' us*. See DAPHNE.

PENGUIN, *pen' guin*. A group of short-legged aquatic birds, unusual in appearance and habits, found principally in Antarctic regions. Penguins show a grotesque resemblance to little fat men in dress suits. In the sea they swim and dive with great facility, catching fish under water with ease. For life in the water, they have developed special adaptations, their wings being used as paddles and their feet as propellers.

On land the birds are handicapped. Their legs are placed so far back on their bodies that they have a ludicrous, waddling walk, and the shortness of the legs makes them poor runners. Some species crawl over the ground, using the wings as forefeet; the wings have only rudimentary feathers, and cannot be bent, but assist the birds in swimming and in sliding down snow slopes. All are flightless. They come to land to breed and rear their young, and are found mainly on small, rocky islands in far southern latitudes, though some species frequent regions as far north as New Zealand, Brazil and the Cape of Good Hope. Penguins live in colonies. Sometimes the eggs are laid in crude nests of sticks, stones, and grass, sometimes in pebble nests on the bare rocks. The female of one species lays and incubates her egg while nesting on solid ice, keeping the egg between her feet and abdomen. Usually but one egg is laid.

The male shares with the female in the work of hatching and rearing the young, which need protection for many weeks. The

penguins do not suffer from the low temperature, as they are kept warm by a layer of fat under the skin.

The largest penguin is the *emperor*, about 3½ ft. in height. Scarcely smaller is the *king penguin*, a closely related species. A very



PENGUIN WITH YOUNG

One of the young birds is an albino

Photo: Cherry Kearton

widely distributed species is the *Adelie*. On the Macquarie Islands, south of Tasmania are found the *royal penguins*.

Scientific Names. Penguins belong to the family *Spheniscidae*. The emperor penguin is *Aptenodytes Forstersi*; the king, *A. patagonica*. The *Adelie* is *Pygoscelis Adelae*, the royal, *Endiptyx Schlegelii*.

PENINSULA, *pen in' su la*. A land area nearly surrounded by water. Connected with the mainland, or continental mass, may be by an isthmus, but this is not necessary.



PENGUINS ON AN ISLAND OFF THE AFRICAN COAST

Photo: Cherry Kearton

the case. For example, the Iberian peninsula, which comprises Spain and Portugal, joins bluntly on to the south of France, and Italy, another important peninsula, is largest where it joins the continental mass, in each instance the point of juncture is too wide to be called an isthmus. A particularly good example of an isthmus connecting a peninsula with the mainland is that of the Isthmus of Perekop, a very narrow strip between the Crimea and Russia proper. See **ISTHMUS**.

PENINSULAR WAR (1807-14). A series of military campaigns fought in Spain by British troops, with some help from Spanish and Portuguese allies, against the French. Portugal, faithful to her tradition of friendship for Britain, refused to recognize the Berlin Decrees of Napoleon, where by the British Isles were declared to be in a state of blockade. In Spain a great uprising of the people took place, and Napoleon's brother, Joseph, who had been put on the throne, was driven from the capital (1808). Great Britain decided to intervene, and an expedition under Wellesley landed in Portugal, which for the next six years served as the base of operations. As British sea power was then unchallenged, naval communications were secure, while the French had chiefly land communications which were constantly harassed by the Spaniards. The victories of Wellesley over Napoleon's generals at Rorica and Vimiera were followed by the Convention of Cintra and the evacuation of Portugal by the French.

The campaigns which occupied the succeeding years were fought mostly on Spanish soil. Sir John Moore conducted a brilliant retreat with rearguard actions against Marshal Soult, ending with the victory of Corunna where Moore was killed (1809). In the same year Wellesley was victorious at Talavera, and in recognition of his services was created Viscount Wellington. In 1810 he constructed a triple line of fortifications at Torres Vedras to protect Portugal from a dangerous thrust by Masséna. A series of successful battles and sieges followed (Fuentes d'Onoro, Albuera, Almeida, Ciudad Rodrigo, Badajos, Salamanca and others), and the French were gradually driven out of south and central Spain.

The French armies were weakened by the withdrawal of troops for Napoleon's disastrous Moscow campaign in the winter of 1812, and at the same time the guerilla warfare waged on the French lines of communication by the Spanish was intensified. The offensive fell increasingly on Wellington, who defeated Joseph Bonaparte at Vittoria (1813), and a month later won the battle of the Pyrenees and invaded France. In April,

1814, Marshal Soult was defeated at Toulouse and the war was practically over.

A number of causes contributed to the success of the British. Reference has already been made to their superior communications, and to the difficulties of Napoleon in having to fight on several fronts. There was dissension between the French marshals, Soult and Masséna, and the poverty of the Spanish countryside made it impossible for the French armies to maintain themselves by forced requisitions. The battle tactics of the British based upon the widely deployed line, were superior to those of the French, who relied upon the shock of compact columns. In the earlier years of the war Wellington had to complain bitterly of the lack of support from the home government under Perceval, who kept him short of stores and money, but under the ministry of Lord Liverpool a more vigorous policy was pursued.

PENN, WILLIAM (1644-1718). The founder of the state of Pennsylvania in the U.S.A. and one of the best known members of the Quaker sect. Penn was born in London, 14th October, 1644, the son of an English admiral who was away at sea so much that he had no part in shaping his son's religious training. In Essex, where William attended school and lived with his mother, the boy came strongly under the influence of Puritan modes of thought. In 1660



WILLIAM PENN
Photo Brown Bros

Admiral Penn sent his son to Christ Church, Oxford, but the youth so disliked the ritual in the college chapel that he refused to attend, and was fined in consequence. A Quaker, Thomas Loe, completely converted him to the Quaker beliefs, and he was sent down for nonconformity.

After a period of travel in France and Italy, he again met Loe and began to work actively in the Quaker cause. On account of his preaching and publishing of unorthodox views on the Trinity, he was imprisoned in the Tower of London for eight months. There he wrote *No Cross, No Crown*.

The death of his father in 1670 made Penn a wealthy man, but he continued his daily preaching, and once more was confined in the Tower. In 1675 he bought from a Quaker a large part of Western New Jersey, and found members of the persecuted sect so

eager to seek refuge there that he petitioned Charles II to repay in American land an old debt that had been due to his father. The King granted him the territory now comprising Pennsylvania and part of Maryland, and gave him absolute power to rule it as he wished. He opened the land to colonists, and they emigrated by thousands. *A Frame of Government*, written by Penn as a code of laws, is still regarded as one of the most liberal charters or constitutions ever issued. The principal town of the colony, Philadelphia ("City of Brotherly Love"), grew with astonishing rapidity.

When William and Marv came to the throne, Penn found himself suspected of various plots against the Government, chief among which was a charge of attempted bribery in connection with pardons. For three years he was in hiding in London, while dissension aroused by other religious sects than his own threatened to ruin the Pennsylvania colony. In 1693, however, he was declared innocent of conspiracy, and in 1699 he again visited Pennsylvania. He soon adjusted all troubles and wrote a constitution that was in use until the colony became a state of the American Union.

In 1701 the plan of William III to declare Pennsylvania a royal province caused Penn to return quickly to London. There false claims for debts were pressed against him so harshly that he allowed himself to be thrown into Fleet Prison rather than pay them.

When, in 1709, he was released through the aid of friends who made a compromise settlement, he no longer possessed the spirit of former days. In 1710 he suffered a stroke of paralysis, but lived until 30th July, 1718.

PENNANT. A narrow streamer or flag displayed on vessels in addition to the flag of the nation, and carrying a special significance. A pennant decreases in width from the hoist to the tip. Pennants on ships are often used for signalling.

PENNINE CHAIN. A mountain range in the North of England, extending roughly from the Cheviots in Northumberland to the Valley of the Trent. The north-and-south watershed formed by the chain determines the course of all the large rivers of northern England. The chain extends into the following counties: Cumberland, Westmorland, Northumberland, Lancashire, Yorkshire, Cheshire and Derbyshire. The maximum height is attained in the north at Cross Fell (2930 ft.). In the south there are numerous caverns in the limestone, and some—such as Gaping Ghyll and Hellan Pot—are over 350 ft. deep.

PENNSYLVANIA, *pen sil'vay' nia*. One of the thirteen original states of the American Union; it has an area of 45,126 square miles and a population (1930) of 9,631,350.

Over 67 per cent of the population is urban, and two of the first ten cities in the United States are in Pennsylvania—Philadelphia and Pittsburgh (which see). Other cities



PENNSYLVANIAN OILFIELD

with over 50,000 inhabitants are Scranton (143,433), Erie (115,967), Reading, Allentown, Wilkes-Barre, Altoona, Harrisburg the capital (80,339), Johnstown, and Lancaster.

Physical Features. Pennsylvania may be divided into four districts—the Allegheny plateaux at the west and north; the Valley-



HORSESHOE CURVE, ON THE PENNSYLVANIA RAILWAY
Photo: Cable Co

mont region, crossing the centre and bending eastward; the Kittatinny trench, crossing north-east and south-west in the south-eastern quarter of the state, and the Piedmont upland covering the south-east corner. The Allegheny plateaux consist in the main of broad-topped ranges, intersected by deep, narrow, steep-sided valleys. At the north-central part of the state, these plateaux reach 2000 ft., but decline in elevation toward the east, west, and south-west. The highest point reached is at Negro Mountain with an altitude of 3220 ft.

The Valleymont region is a belt from 40 to 60 miles wide, consisting of very narrow, even-crested ridges which rise from 1500 to 2000 ft., separated by broad, usually fertile valleys.

The Delaware River drains the eastern edge of the state; the Susquehanna drains all of the central and much of the northern part; the Ohio, formed by the Allegheny and Monongahela, provides drainage in the west.

Agriculture. Pennsylvania, especially in its valleys, is generally more fertile than the other North Atlantic states. Cereals and hay are the most valuable crops. Maize is the most important single crop. Wheat, oats and rye are also harvested in large quantities.

The great mining and manufacturing centres furnish a steady and profitable market for the dairy-farmers. There are large orchards growing fruits of many kinds near the cities.

Minerals. Pennsylvania exceeds all the rest of the states in the value of its mineral products. This is due principally to the

state's leadership in the production of coal. Practically all the anthracite coalfields in the United States are in Pennsylvania. The mining of anthracite increased from one ton a day in 1820 to about 140,000 tons a day in 1900, and the present output ranges from 60,000,000 to 90,000,000 short tons per year.

Two other great sources of fuel are petroleum and natural gas.

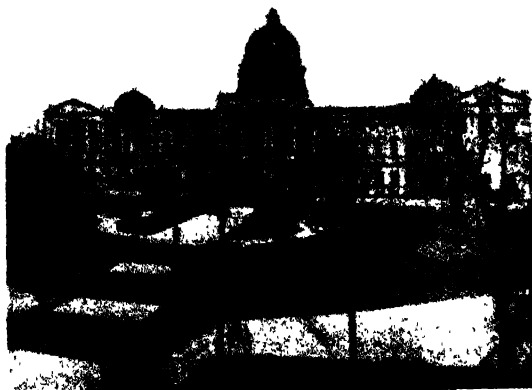
Iron ore, slate, clay, limestone, lime, glass, sand and gravel are among the other minerals and products of commercial importance.

Manufactures. The abundance of fuel and raw materials, excellent means of transport, the availability of cheap labour and the proximity of markets, such as New York, Philadelphia, and Pittsburgh, have all combined to develop the great manufacturing industries of Pennsylvania.

Steel is manufactured in great quantities, and there are locomotive works, shipyards, and railway machinery shops.

In value of the product, manufacture of silk ranks second to iron and steel. To-day, the extensive manufacture of worsted, cotton, woollen and knitted goods, together with that of silks, makes Pennsylvania a great textile state.

Pre-eminently a manufacturing state, Pennsylvania's list of industries is a long one.



CAPITOL BUILDING, HARRISBURG
Photo: U. & U.

Government. The constitution of 1873, with a few amendments, is the present basic law of the state.

Legislative Department. The law-making body is the general assembly, consisting of a Senate and a House of Representatives.

Executive Department. The power of administering the government is vested in a

Governor, Lieutenant-Governor, Auditor-General, State Treasurer and Secretary of Internal Affairs, who are elected for four years. Other officials are appointed by the Governor.

Judiciary. The judicial department consists of a Supreme Court and a Superior Court, each having seven judges, and inferior courts. All judges are elected by the people, those of the Supreme Court for twenty-one years, and all others for ten years.

PENNY. A bronze English coin, equivalent to one-twelfth of a shilling. In a pound sterling there are 240 pennies, and each penny weighs $\frac{1}{24}$ of a pound Troy. The English penny has had its present weight and metal since 1860, when bronze was substituted for silver. The metal is an alloy containing copper (95 parts), tin (4 parts), and zinc (1 part).

The penny is a very old coin, dating from Anglo-Saxon times. Until the reign of Edward I, it was deeply broken into two or four equal parts, thus giving halfpennies and farthings (four things). Its abbreviation is *d.*, from its similarity to the Roman coin *denarius* (which see). A German copper coin has a similar name, *pfennig*, and the United States one-cent piece is commonly called a penny.

PENNYROYAL. A medicinal herb of the mint family, the leaves of which have a strongly pungent odour. The oil yielded by the plant is used in medicine for its stimulating properties. Preparations containing oil of pennyroyal are used to drive away

mosquitoes. Its stem, which is branched and hairy, grows from 6 in. to 1½ ft. in height, and bears small, purple flowers that bloom from July to September. Pennyroyal is native to Europe, but there is a similar species in America, sometimes called "tick-weed."

Scientific Names. Pennyroyals belong to the family *Menthaceae* or *Labiales*; the European species is *Mentha pulegium*.

PENRITH. A Municipal Borough, Urban District and market-town of Cumberland with an area of 7585 acres and a population of 9065 in 1931. It is an ancient market town, and chiefly depends on trade with the agricultural population and seasonal trade due to the influx of summer visitors. It has been called the northern gate of the English Lake District, and is situated 5 miles from Ulswater, and slightly farther from Haweswater. The town is well known for its literary associations with Wordsworth. In the course of the border warfare with which it has always been connected, the Battle of Clifton Moor took place near the town boundary. Penrith Castle is the old fortress of the Neville family. The dismantling began at the end of the Great Civil War. Considerable portions of the original structure and the moat remain relatively intact. Another house of great historic interest is the Gloucester Arms Hotel, at one time a residence of Richard III. St Andrew's Parish Church is of very ancient foundation. The massive tower was built by Warwick "the Kingmaker," and the church contains



PENRITH CASTLE AND PARK

original portraits of Richard III and his wife in stained glass, while in the churchyard is the celebrated "Giant's Grave."



ULLSWATER, NEAR GOWBARROW PARK
On the north shore, nine miles from Penrith
Photo. Kerds, Ltd

PENSION. A term (from the French word of similar meaning, ultimately from Latin *penso*, payment) applied to any gratuitous sum of money paid to a person at regular intervals, although often the recipient has contributed to the fund from which he is eventually paid, e.g. municipal corporations pay pensions to superannuated employees who have contributed to the scheme. Nations award payments to citizens who have given special service of a kind that deserves recognition, or to their dependants who may be in privation. In Britain these payments are known as Civil List Pensions, a charge on the Consolidated Fund, recommendations for the award being made by the First Lord of the Treasury. In some countries, aged persons are supported by regular pensions from the Government (see OLD-AGE PENSIONS). Widows and orphans of insured men in Britain are paid weekly pensions. The payments made to those disabled in the World War are referred to under PENSIONS, MINISTRY OF.

Service Pensions. In the case of the armed forces of the Crown, a particular difficulty arises in that the period of useful service is soon terminated by advancing age, and

pensions are paid comparatively early. These are administered by the Air Ministry, the Admiralty and the War Office. A similar position arises in the case of members of the police force. These service pensions are justified by the fact that although the recipients are comparatively young, yet they are old enough to be barred from engaging in other than unskilled occupations, where there is little prospect of advancement. Criticism is often directed to those cases, however, where the receipt of a pension enables the pensioner to accept employment at rates lower than the normal.

Pensions payable to civil servants on retirement may be classed as service pensions, but in these cases they are not paid until the normal retiring age; these pensioners, therefore, do not enter the labour market after retirement. It is generally considered that the pensions payable to civil servants are borne in mind when salary scales are drawn up, the salary rates being lower than they would be if no pensions were available. Teachers and local government officers, however, are not in the same category as civil servants; their pensions are dependent on a contribution towards the superannuation fund.

Pensions in Business. It is when we look to the business world, as distinct from employment in the public services, that the pension problem becomes acute. In Britain employers are faced with the fact that only those who come within the scope of National Insurance—those with incomes of less than £250 per annum, except in the case of manual workers, when there is no limit—have State provision for a pension—10s. per week at the age of 65. Uninsured workers cannot claim a pension until 70 years of age, and then must undergo a means test (see OLD-AGE PENSIONS). Thus, all non-manual workers with salaries of £250 or more are left to their own resources to provide for old age. Some employers feel that they have a moral obligation to long-service employees. At one time it was the practice to retain them in work long after the time when they ceased to be worth the salary paid them, but this practice is as economically unsound as retaining old and obsolete machinery because adequate provision has not been made for depreciation or replacement, and, moreover, the retention of such employees bars the way to the promotion of younger men. If, when the employee has ceased to be of economic value, the employer decides to "pension him off," a charge of this nature may become very onerous (especially if there are a number of pensioners) should economic conditions become adverse, and if bankruptcy or liquidation ensue, such as

gratia payments cease and the "pensioner" is left stranded.

The establishment of a Pension Fund is a more satisfactory plan, and payments into the fund by the employer can be considered as a charge against gross profits, just as provision is made for the depreciation of machinery. The feeling of security which arises in the mind of the employee will react to the benefit of the firm, for a worker assured of provision for his old age will be more content to remain in the service of one employer. His health, too, is not endangered by anxiety for the future. Valuable, too, is the spirit of co-operation which is engendered. Labour turnover—a costly item in production—is thus reduced.

A decision to institute a pensions fund having been made, the employer must make a choice between a contributory and a non-contributory scheme. In the one case the worker makes a contribution to the fund from his wages or salary, and does not leave the whole of the amount to be found by the employer, as is done in the non-contributory plan. A non-contributory plan obviously appeals to the workers, and probably in the long run causes more satisfaction to employee and employer. The non-contributory scheme should be made conditional on the employee's taking out a policy of assurance on his own life in order to make provision for his dependants in the event of his premature death.

Few employers are willing to conduct the management of pension funds. The actuarial work involved is really for the expert, and so life assurance companies often take over the administration. In case of depreciation of investments and lower interest rates, it is better that the fund shall be in the hands of a life office whose investments are so great that the income of the fund will not be seriously endangered.

See also SUPERANNUATION SCHEMES.

PENSIONS, MINISTRY OF. A separate Ministry of State, established by the Ministry of Pensions Act, 1916, to deal with pensions arising out of the World War. "Service" pensions awarded to the regular fighting forces remain under the control of the Admiralty, the War Office and the Air Ministry, but pensions and grants on account of disablement in war service, and pensions and gratuities awarded to the widows and dependants of the fallen, are administered by this Government Department, which also provides medical treatment and vocational training for the disabled. Local War Pensions Committees have been established in all counties and county boroughs, and many of the large non-county boroughs and urban districts, to make recommendations for the

award of pensions, and to hear complaints by recipients of the pensions. Pensioners may, on application to the Minister, commute the weekly pension to a capital sum.

PENTAMETER, *pen tam' e ter*. See METRE.

PENTATEUCH, *pen' la tūke*. A term (Greek, "five books") referring specifically to the first five books of the Old Testament, believed to have been originally one work. Scholars now include a sixth book, Joshua, and call the whole the *Hexateuch*. These old Scriptures were compiled from four different sets of documents. These are known as (1) E, in which the Name of God is "El," (2) J, in which the name of God is Jehovah or Yahweh, (3) D, the book of Deuteronomy, and (4) P, the Priestly Code.

It is impossible here to describe fully how these are interwoven. J is earliest, and was combined with E into a narrative called by critics JE. The book of Deuteronomy (D) is the Book of the Law, found in the archives of the Temple in the time of King Josiah. This was inserted later into the JE narrative, and P—the latest of the documents—rounds off the whole.

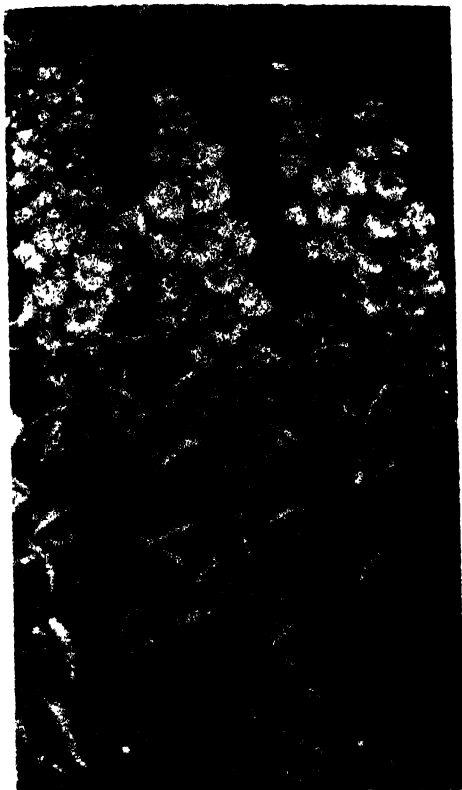
PENTECOST, *pen' te kost*, OR **FEAST OF WEEKS**. A Jewish festival celebrated as a token of thanksgiving for the ingathering of the grain harvest, and also known as the Feast of Harvest. It is observed on the fiftieth day after the Passover (which sees which marked the opening of the harvest). The name Feast of Weeks refers to its occurrence seven weeks after the second day of the Passover. An offering of two leavened wheaten loaves was made for the community, and individuals brought offerings according to the abundance of their harvest (Deuteronomy xvi. 10).

The Christian Pentecost, held 49 days after Easter, celebrates the descent of the Holy Spirit (Acts ii. 1-4). The name Whitsunday, often given it, refers to the white garments worn on that day by candidates for baptism.

PENTLAND FIRTH. A strait separating the Orkney Islands from the mainland of Caithness, from 7 to 14 miles wide. There is an eastward tidal current which at times reaches 12 miles an hour, causing a number of whirlpools and eddies. None the less, this is the main channel used by vessels passing round the North of Scotland. The Pentland Skerries have a lighthouse.

PENTSTEMON, *pen' ste mon*. A family of hardy and half-hardy herbaceous plants that flower profusely. Many reach 4 ft. in height, and if chosen with care, they can be made to fill a corner of a garden with a wide variety of colour, as they produce flowers of every hue excepting yellow. Blue, white,

and crimson varieties are popular. They thrive best in a rich soil, with a sunny situation, and can be grown either from seed

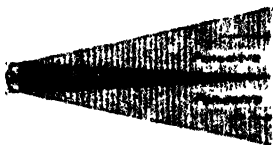


PENTSTEMON
Photo: Sutton & Sons

or cuttings. Most varieties are perennials; hybrids develop best if treated as biennials. The bell-shaped flowers cluster in crowded groups on spikes. Nearly all varieties flower from July until well into the autumn.

Scientific Names. The Pentstemon is of the natural order *Scrophulariaceae*. Popular garden varieties are *Pentstemon barbatus*, and *P. centranthifolius*.

PENUMBRA, *pen um' bra*. A partial shadow cast during an eclipse (from Latin for



"almost a shade"). In the accompanying figure the more lightly shaded portions show

the penumbra. From the darker, cone-shaped figure, rays from the sun (a) are cut off by the intruding body (b), and a total shadow, called the *umbra*, results. If the observer is within the penumbra, he sees a partial eclipse. If he is near the dark cone, the obscuring body will almost cover the sun's disk; but if he is stationed near the outer edge of the penumbra, the object will appear to encroach but little on the source of light. See ECLIPSE; SHADOW.

PENZANCE. A Municipal Borough of Cornwall, situated on Mounts Bay and a terminus of the G.W.R., 305 miles from London. It has an area of 3578 acres and a population (1931) of 19,962. It is of importance both as a market-town and as a holiday resort. Since the fourteenth century a market has existed without a break, whilst the town's incorporation as a Borough dates from the beginning of the seventeenth century. The principal trade carried on is in local market-gardening products, and in flowers and fruit which are shipped from the Scilly Isles. The fishing industry, though on the decline, is one of the largest in Cornwall.

The greater part of the town is modern, despite the antiquity of the site. In Mounts Bay, however, St Michael's Mount, the English counterpart of the French Mont St Michel, has a long history. By tradition this was the Ictis mentioned by Diodorus, and a port of call used by Phoenician traders (see CORNWALL). In 1595 a force of Spanish soldiers landed and laid waste the whole of Penzance. In 1646, again, after a brief siege the town was practically destroyed by General Fairfax. Its modern growth began when the railway was built from London, thus making it a distributing centre for the whole of S.W. Cornwall.

PEONAGE, *pe' on ayj*. A system of enforced labour formerly existing in the Spanish colonies in America, particularly in Mexico. The term is derived from the Spanish *peon*, signifying "day labourer," and originally referred especially to Indians.

PEPIN, OR **PIPPIN**. The name of several officers, prominent in the early history of France, who bore the title of *mayor of the palace*, but had in reality the authority of kings. **PEPIN THE ELDER**, who died in 639, virtually ruled the kingdom during the reign of the weak Merovingian king Dagobert I. His grandson, **PEPIN OF HERISTAL** (died 714), was appointed mayor of the palace over the eastern part of the kingdom only, but finally succeeded in gaining control of the whole country. A natural son of Pepin of Heristal was the famous Charles Martel. The latter's son, Pepin the Short, ruled from 751 to 768.



PENZANCE, PROMENADE AND FORESHORE

Photo: Penzance Corporation

Pepin the Short (714-768), like his predecessors, began his career as mayor of the palace. The people had come to recognize the utter feebleness of the Merovingian kings, and in 751 Pepin was able to depose King Childeric and have himself crowned king. He was the first of the Carolingian dynasty (see CAROLINGIANS). In two invasions of Italy, he overthrew the Lombards. Pepin was succeeded by his son Charlemagne.

PEPPER. The familiar black pepper is the product of a trailing or climbing shrub cultivated in the East Indies and other tropical regions. The plant bears a small green berry about the size of a pea, which turns red on ripening. The berries are gathered just when they begin to change colour, and are then cleaned, and are dried, either in the sun or before a slow fire. In drying, the berries turn black, and when ground and sifted, they form the black pepper of commerce.

White pepper is obtained from the ripe berries of the same plant. These are bruised, then washed until freed from the pulpy matter and stalk, and finally dried. White pepper, though it has a finer flavour than black, is not so pungent. Red pepper is obtained from species of *capsicum* (which see), and the so-called Jamaica pepper (see ALLSPICE) from the pimento tree.

The sharp, biting taste of ordinary pepper is due chiefly to an acrid resin and a bitter oil.

Scientific Name. The pepper family is known to botanists as *Piperaceae*. The scientific name of the black pepper shrub is *Piper nigrum*.



PLANTS FROM WHICH BLACK PEPPER IS PRODUCED

PEPPERMINT. A perennial herb of the mint family, cultivated extensively for the pungent oil produced in glands of the leaves. This oil, the widely used peppermint of commerce, is valuable medicinally and as a flavouring. Preparations of it for alleviation of colic and toothache are well known.



CUTTING PEPPERMINT

Menthol is also derived from the oil, and is obtained by subjecting it to the low temperature conditions which cause the menthol to crystallize. Peppermint is used also in perfume and soap manufacture. The oil is obtained by means of pressure and distillation.

The plant, which is native to England, grows from 1 to 3 ft. high, and bears smooth, sharp pointed, oval leaves and small bluish-white flowers. It is cultivated in England

and in various parts of continental Europe. The crop is cut in August, just before the flowers open. The United States and China supplement the world's needs.

Scientific Name. Peppermint belongs to the family *Mentaceae* (or *Labiatae*). Its scientific name is *Mentha piperita*.

PEPPER TREE. A tree usually of medium size, so called from its clusters of pungent



WILD PEPPERMINT

Photo: R. J. Hoshing



FRUIT AND LEAVES OF PEPPER TREE

Photo: Visual Education Service

red berries. Pepper trees have no real connection with the familiar spice plant. One species, a rapidly growing tree which reaches a considerable size, is cultivated extensively in California; other species are common in tropical and sub-tropical parts of America.

Scientific Name. Pepper trees belong to the cashew family, *Anacardiaceae*.

PEPSIN. A ferment found in the gastric juice, which has the property of converting proteins (tissue-building foods) into peptones. In chemical composition, it is not greatly unlike the ferment of saliva, *ptyalin*, but its effects are different. It acts in the presence of a weak acid, whereas ptyalin responds better to a slightly alkaline medium. It is produced commercially by drying the mucous lining of the stomachs of pigs and calves, and is then used as a digestive aid by those suffering from ailments due to the absence of hydrochloric acid. See FERMENTATION; PEPTONES, below.

PEPTONES. In the process of digestion, protein foods (such as lean meat, white of egg, peas and beans) are acted upon by the ferment *pepsin* of the gastric juice, and the ferment *trypsin* of the pancreatic juice. These ferments change proteins into compounds called *peptones*; the latter have the power to pass through membranes and so can be absorbed from the alimentary canal, while ordinary proteins cannot. The change from proteins to peptones is made for the purpose of absorption, for in the walls of the intestine, the products of protein digestion are recombined to form tissue-building compounds that are taken up by the blood-vessels and the lymphatics. See DIGESTION.

PEPYS, peeps, SAMUEL (1633-1703). An English official who is remembered to-day mainly because he kept a diary that is a classic. He was born in London and educated at St. Paul's School and at Cambridge. Through the influence of Sir Edward Montagu he was given a clerkship in the Navy, and subsequently was made secretary of the Admiralty. A few years later, Pepys was accused of sharing in the conspiracy to overthrow Charles II and the power of Protestantism. The charge having been disproved, he was soon released without a trial and again given his office in the Admiralty, which he kept until 1689, when William and Mary came to the throne. Thereafter he



SAMUEL PEPYS
(National Portrait Gallery)

lived in retirement. Pepys gave to Magdalene College, Cambridge, a library formed, in part, of a large number of old English ballads. He left memoirs of his experiences in the Navy. Pepys may be regarded as one of the greatest naval officials England has ever had. The results of his organization and reform were felt for over a century.

In his *Diary*, Pepys chronicles events as he saw them during nine years of his active



PEPYS' HOUSE, BRAMPTON
Photo. Whitney, Huntingdon

life—from 1660 to 1669—with an honest exactness of detail, and an unconscious humour that make it unique in world literature. He not only deals with events in the reign of Charles II, but with personal incidents in his own life, which make it very evident that he intended the *Diary* for himself alone. He not infrequently portrays himself as an odious, greedy, cowardly individual. Despite his many faults, in his unconscious manner he also reveals acts of kindness and generosity. His work at the navy office gave him great opportunity for keen observation in the world beyond his home, and his comments and fund of anecdotes make up a human document of rare vitality.

The diary was written in small handwriting in six volumes. He used a system of shorthand, which he amplified by his own character inventions and by using foreign languages. The manuscript was deciphered by John Smith, Rector of Baldock in Hertfordshire, between 1819 and 1822; the first and partial edition was edited by Richard Neville Griffin. The standard edition, in nine volumes, is by H. B. Wheatley, with a supplementary volume of *Pepysiana*.

PERA, pair' a. Constantinople's foreign quarter. See CONSTANTINOPLE.

PERAK, perakk'. One of the four governments of the Federated Malay States (which see).

PERCENTAGE. The process of computing by hundredths (Latin *per*, by; *centum*, hundred). The symbol for "per cent" is %.



SOME OF THE PERENNIALS

Delphinium. 2. Hollyhock. 3. Penstemon. 4. Columbine. 5. Campanula. 6. Fuchsia. 7. Phlox.
 Evening Primrose. Pyrethrum. 10. Michaelmas Daisy. 11. Polyanthus. 12. Pansy. 13. Lupin.
 14. Sweet Violet.

Percentage was in use in centuries past. Reckoning so many out of 100 is a simple method of designating parts, proportions, relative values, etc., and is now much used in statistics.

PERCEPTION. When the reader looks at the book in front of him, he receives certain visual impressions of colour and light and shade having a certain form. But his experience is more than mere sensation. The sensations convey meaning, a meaning that is derived from all his past experience of feeling, handling and dealing with books. This special "sensation" constitutes the perception of the object. See ILLUSION; SENSATION.

PERCEVAL, SPENCER (1762-1812). Prime Minister of England under George III, he was educated at Harrow School and Trinity College, Cambridge. He took up the profession of law, and after some distinguished practice became K.C. in 1796 and Member of Parliament for Northampton in the same year. He was a member of Addington's Cabinet, and in 1807 became Chancellor of the Exchequer under Portland, whom he succeeded two years later as Premier. He was severely attacked on account of his share in launching the ill-fated expedition to Walcheren and his niggardly support of Wellesley in the Peninsular War. He met his death at the hands of an assassin in the lobby of the House of Commons.

PERCH. A family of about 125 species of fresh-water fish, distributed in the cooler parts of the northern hemisphere. The perches have elongated bodies, either flattened or round, and small, rough scales. A perch may be taken as a representative *teleost* (the group that includes ordinary bony fishes; that is, typical fishes). Individuals vary considerably in size, the largest specimens being 3 ft. long and weighing



PERCH
Photo: Barridge

25 lb. But the typical perch of British rivers and lakes does not usually exceed 3 lb. when full-grown. The prevailing colour

also varies, being yellow, grey, or blue. The flesh is very agreeable and is firm and white. The scientific name of the common perch found in British and other waters is *Perca fluviatilis*.

PERCY, HOUSE OF. See NORTHUMBERLAND, EARLS OF.

PERCY, THOMAS (1729-1811). A learned clergyman, later Bishop of Dromore, who made himself famous by the publication in 1765 of his *Reliques of Ancient Poetry*, a collection of old English and Scottish ballads. Although Percy patched up and modernized many of those ballads in a clumsy fashion, the collection proved extremely popular, and was one of the main influences working in English literature towards the Romantic Revival. Percy's antiquarian interests were wide-ranging, and he did much to popularize the literature of remote and primitive peoples.

PERENNIALS, per en' i-als. Plants that live and blossom for more than two years. Plants whose life span is two years or two growing seasons are called *biennials*, and those which live a single year are called *annuals*. Among herbaceous flowering plants, many so-called perennials are often only at their best for one or two summers, afterward deteriorating or dying out (e.g. Foxgloves, Columbine, Pentstemon). Of true perennials, which produce their blooms indefinitely and even improve from year to year, some of the most reliable are Delphiniums, Japanese Anemone, Shasta Daisy, Oriental Poppy and hardy autumn-flowering Chrysanthemums. Most perennials may be grown readily from seed, provided it is sown as soon as ripe, that is, during late summer and autumn. The plants thus raised may be put in their flowering positions in spring, and should provide a feast of bloom the same year. Certain perennials like the tall chrysanthemums are best increased by division of the roots.

PEREZ, pay' rayth, ANTONIO (1539-1611). Secretary and factotum to Philip II of Spain; was a native of Aragon. He was the principal agent of the King's despotism, and the instigator of his intrigue against his brother Don John of Austria and Escobedo, the minister of the latter. Escobedo was assassinated in Madrid in 1578 at the instance of Perez, who sheltered himself by pleading the King's authority. The King's confidence had turned to hatred, but Philip could not, without implicating himself, bring his former secretary to book. Perez escaped to Aragon and then to France and England, where, during his remaining years, he exerted himself in encouraging anti-Spanish feeling.

PERFUME. As far back as we can trace the story of religious ceremonies, we find that perfumes, usually in the form of incense, were associated with them, and it is probable

that from this association arose the ancient custom of presenting aromatic gums like frankincense as a token of esteem for the recipient.

The making of perfumery is one of the arts in which Cyprus, China, Peru, Burma and especially France excel. Perfumes may be classified as animal, vegetable and artificial.

Animal Perfumes. The principal animal scents used in perfumery are ambergris, civet and musk (see separate articles); castoreum, a substance obtained from the beaver, is also used to a less extent.

In concentrated form, all these perfumes are so strong as to be nauseating, and their preparation for the market requires skill and care. The original substances are soaked or macerated in alcohol to form tinctures; these are so strong that they can be used only in small quantities in the preparation of perfumes, to which they give permanence and potency.

Vegetable Perfumes. There are so many vegetable perfumes that it is impracticable to name them all. Perfumed plants contain little sacs or glands in which the odoriferous substance is stored, and the part of the plant used in its extraction is the part in which these glands are found in the largest numbers. The most delicate perfumes come from the blossom, as in the case of the rose, the violet and the heliotrope. The oils of these flowers are extracted by distillation, as in making the attar of roses, and by the use of fats for more delicate perfumes. Glass vessels are lined with fat, and the petals of the flowers are spread over its surface. The fat extracts the oil, and one supply of petals follows another until the fat becomes saturated. It is then placed in closed vessels with alcohol and heated. The alcohol dissolves the essential oil of the flower and rises to the top of the liquid, from which it is easily separated. A ton of petals yields from 10 oz. to 1 lb. of oil.

Some oils are found in the peel, as are those of the orange and the lemon. Those of the mints occur in the leaves and stems, and are obtained by distillation. The perfumed part of the cinnamon is the bark. Rosewood, cedar and sandalwood bear their odours in the wood. Cloves and nutmeg bear them in the seed, and the sweet-smelling gums are obtained by bruising or cutting the trees which produce them.

Artificial Perfumes. Within the last half-century, industrial chemistry has made possible the imitation of practically all vegetable and animal perfumes, so easily and so cheaply that their manufacture has become a great industry. With the exception of a few very expensive scents still made from flowers, all

perfumes now sold had their beginning in a chemical laboratory.

The imitation may contain the same chemical compounds which are in the natural perfume, or it may be a compound quite unrelated, but which has an identical odour. Heliotrope, lilac, and artificial musk were among the first successful synthetic perfumes. Coal-tar products yield almost all of the aromatic compounds.

France is the leading country in the manufacture of perfumes. At Cannes, Nice, Nîmes and Paris there are extensive manufacturing factories. England leads in the production of lavender, and Turkey and Bulgaria are noted for attar of roses. See **ATTAR**.

Eau de Cologne is a blend of certain aromatic oils (rosemary, bergamot, orange and citron among others) with distilled alcohol, though its actual composition is a trade secret.

PERGAMUM, *per' gam um*, or **PIRGAMUS**.

(1) Name of the citadel of ancient Troy, used poetically for the city itself. (2) A city situated about 70 miles to the south east of Troy, capital of the province of Mysia, later of the Asiatic kingdom of Eumenes and Attalus, and then of the Roman province of Asia. Parchment (*pergamena carta*) was invented here.

PERICARDITIS. See next article.

PERICARDIUM. A cone-shaped sac of connective tissue which encloses the heart and a small portion of the large blood-vessels at the base of that organ. The apex of the pericardium is behind the breastbone, and its base is attached to the upper surface of the diaphragm. It has a lining of smooth, serous membrane (see **MEMBRANES**), which entirely covers the heart; the inner surface of this lining secretes a lubricating fluid that serves to lessen the friction that would otherwise result from the movement of the heart. The outer layer of the pericardium consists of strong interlacing fibres. When the sac becomes inflamed, it causes the disease known as *pericarditis*. See **HEART**.

PERICLES, *per' ri kleez* (? -429 B.C.). A Greek statesman. He was born at Athens of a noble family, and was educated by the greatest philosophers of his day, but when he entered public life, it was as the advocate of the rights of the common people. For thirty years he stood supreme in Athens, and the "Age of Pericles" became the symbol for all that was most valuable in the art and science of the ancient world. Pericles completed the work begun by Cleisthenes of making Athens into a complete democracy, and overthrew the reactionary, aristocratic party which was previously in power under the leadership of Cimon. The downfall of Cimon's party was marked by Pericles'

successful attack on the Court of the Areopagus (a criminal Court with wide but vague disciplinary powers)—which was regarded as the stronghold of Athenian conservatism.

Pericles introduced salaries, first for the jurors and later for all public offices. He also provided that the State should pay the admission fees to the theatre for all who could not afford to do it themselves, attendance having a religious significance.



PERICLES
(Vatican, Rome)

In pursuance of his design to make Athens supreme in Greece, Aegina and Naupactus were reduced; Euboea was won back and Samos was subdued. The subject states poured money into the Athenian treasury, and with these funds, Pericles built the temple of Nike Apteros, the Propylaea, and great-

est of all, the Parthenon. Their erection gave employment to many men, and Athens enjoyed a period of unexampled prosperity.

During the Peloponnesian War, the outbreak of which some writers attribute to the influence of Pericles' wife and former mistress, Aspasia, the Athenians had at first some success, but in 430 B.C. a plague broke out in Athens. Blaming Pericles for their woes, the people deposed him, but he was soon recalled. In 429 B.C. he himself died of the plague.

PERIGEE, *per' ri je* (Greek *peri*, near, *ge*, earth) In astronomy, that part of the moon's orbit which is nearest the earth. When at this point, the moon is said to be in *perigee*. The point opposite the perigee and farthest from the earth is called the *apogee*.

PERIHELION, *per' ri he' le on*. See **APSIDES**.

PERIM, *peh reem'*. An island of 5 square miles, lying in the strait of Bab el Mandeb at the southern end of the Red Sea, 110 miles from Aden. There is a good harbour used as a coaling station. The climate is hot and dry, and the island is virtually barren. It was held by the British in 1799-1800 and was annexed in 1857. Formerly under the jurisdiction of the Governor of Bombay Presidency, Perim is now controlled by the Chief Commissioner of Aden.

PERIODIC LAW. See **CHEMISTRY**.

PERIOSTEUM, *per' ri os' te um*. See **BONE MEMBRANES**.

PERIPATETIC, *per' ri pa' tet' ik*, **SCHOOL OF PHILOSOPHY** (Gr. *peri*, about; *patem*, walk).

When the philosopher Aristotle was lecturing to his followers, he was accustomed to walk about under the porticoes of the Lyceum at Athens. Both master and pupils walked about as they spoke together, and because of this custom, or because they discoursed beneath a shaded walk, the philosophic school established by Aristotle came to be known as the *Peripatetic*. Strato and Theophrastus were among its members.

PERISCOPE. A sighting instrument, used in trench warfare, etc., but chiefly valuable as the "eye" of a submarine. Here it is the instrument by which objects or ships which are on the surface are seen from a submerged submarine. In its simplest form, it consists of a vertical

tube which is provided at each end with a reflecting mirror or prism. These reflecting surfaces are parallel and arranged at an angle of 45° with the



PERISCOPE

This device illustrates the principle of the periscope, in actual use in submarines, it is highly perfected. In the above diagram, two mirrors (*aa*) are placed in such positions that beams of light entering the open space at the top are reflected into the first glasses. The periscope is not a new idea in mechanics, it applies the physical laws that light travels in a straight line, and that the angle of incidence equals the angle of reflection.



LOOKING THROUGH THE PERISCOPE
Photo. Fox

axis of the tube. Between them there are several lenses. When the periscope is above the surface of the water, the mirror at the upper end catches the reflection of objects in front of it. The images formed are then transmitted to the mirror at the lower end.

PERISTALTIC, *per ri stal' tik*, **WAVES**. See STOMACH.

PERITONEUM, *per ri tō ne' um*. A thin membrane which lines the abdominal cavity, and covers its enclosed organs and those of the pelvis. The peritoneum is the most important of the serous membranes; its inner layer is arranged in folds which serve to keep the organs in position. Freedom of movement of these organs is made possible by a thin fluid which moistens the inside of the peritoneum. Inflammation of this membrane is known as *peritonitis*.

PERITONITIS, *per ri tō ni' tis*. Inflammation of the serous membrane which lines the abdominal cavity (see **PERITONEUM**). *Acute* peritonitis comes on suddenly and runs its course in about a week. *Chronic* peritonitis is long-continued and is usually of tubercular origin. The *localized* variety affects a small part of the membrane, and the *general* or *diffuse* type involves a large area. Acute peritonitis is caused by bacterial infection resulting from rupture of the appendix or other organs, from intestinal ulcers and injuries to the alimentary tract, or from various diseases which may affect the organs of the abdominal cavity. Its symptoms are mainly its sudden onset, chills, fever, rapid pulse, severe pain in the abdomen, difficult and painful breathing, vomiting and intense thirst; the severity of the pain causes a characteristic pinched appearance of the features.

When due to perforation of an organ, immediate operation is usually advisable and sometimes necessary to save life. In non-perforative cases, the physician administers drugs to relieve pain and control vomiting, and gives saline purgatives. In localized cases, hot applications are often helpful in relieving pain.

PERJURY. (Latin, *per* and *iurare*, to swear.) Making a false statement on oath. The taking of oaths, that is, the calling upon a deity to witness the truth of what has been or is about to be said, has always been a prominent feature of legal procedure, and punishments have always been imposed on the false swearer.

In primitive times the offence was regarded as extremely serious, as it was thought that a false oath might bring the vengeance of the offended deity on the whole community.

In modern English law the term perjury is confined to the case of a person sworn as a witness or interpreter in judicial proceedings

who wilfully makes a statement, material to the proceedings, which he knows to be false or does not believe to be true; the maximum penalty is seven years penal servitude. It is a good defence to a charge of perjury or any similar offence to prove that the accused honestly believed the truth of his statement. No conviction for any of these offences can be obtained solely on the unsupported evidence of one witness.

Subornation of perjury (procuring a person to commit perjury), and inciting or attempting to procure a person to commit perjury, or any similar offence, are also punishable.

PERMALLOY, *perm' al oi*. An alloy of about 80 per cent nickel and 20 per cent iron. It is used to wrap the core of a submarine cable, and automatically increases the magnetic effect of the current, which keeps the signals from jumbling, sharpens them, and improves the carrying capacity beyond anything previously known.

Short-length tests have shown a carrying capacity of 1500 letters per minute, a long cable treated with it transmitted 1700 letters per minute. See **CABLE**, **SUBMARINE**.

PERMANENT COURT OF INTERNATIONAL JUSTICE. Popularly referred to as the **HAGUE COURT**; a Court of International Law for the peaceful settlement of disputes between nations.

The Treaty of Versailles established the League of Nations, and the Council of the League was directed to "formulate and submit to the members of the League for adoption, plans for the establishment of a Permanent Court of International Justice." Agreement on the plans was achieved in December, 1920. The judges were chosen in September, 1921, and the first regular session was opened at The Hague on 15th June, 1922.

There are fifteen members of the Court, and four deputy judges; they are elected by the Council and Assembly of the League of Nations, but in pursuance of their duties they form an independent body. The term of office is nine years, and members may be re-elected. The judges are distinguished jurists of different nationalities.

The Court cannot exercise compulsory jurisdiction, except in cases where nations by agreement have conferred upon it such powers. Any international question may be referred to the Court by agreement of the countries concerned, and the League of Nations may refer any question to it for a legal opinion. The nations which are members of the League are pledged under the League Covenant to refer disputes with each other, or with an outside Power, either to the Council or Assembly of the League, or to arbitration tribunals set up by agreement.

or finally to the Permanent Court of International Justice. The Court must meet at least once each year, with a full bench. If less than eleven ordinary judges are available, the number is made up to eleven by calling on the deputy judges. Nine judges form a quorum.

PERMIAN PERIOD. In geology, the period at the close of the Palaeozoic Age (preceding the Triassic), though by some geologists it is ranked as the final epoch of the Carboniferous Period. The name is derived from Perm, a province in Eastern Russia. The rocks are largely land or fresh-water sediments, but include some marine beds; they are chiefly sandstone, shale and limestone. Gypsum deposits are abundant, and the great salt beds of Northern Germany are of Permian Age.

The Permian was a transitional epoch between the Palaeozoic Age and the early part of the Mesozoic Age. It was a time of widespread uplift in the continental conditions, and of mountain-building in some regions. There was extensive glaciation as attested by glacial conglomerates in all continents.

The geographic changes of the time seem to have had a disastrous effect on both plant and animal life, and the Permian rocks contain relatively few fossils. Several groups of invertebrates died out. There were, however, marine and fresh-water fish; amphibians reached a greater importance than at any time since, and primitive reptiles were remarkably developed. The earliest known cone-bearing trees appeared. The ferns evolved into forms similar to those now common.

PERNAMBUCO. See BRAZIL.

PEROXIDE OF HYDROGEN. See HYDROGEN PEROXIDE.

PERPENDICULAR STYLE. A style of Gothic architecture, best exemplified in English church building of the fifteenth century (1380-1530). It is characterized by the predominant upward-mounting lines and large, more or less rectangular window spaces, with an effect of lightness, especially noticeable in interiors. Fan vaulting was often used. Well-known examples are King's College Chapel, Cambridge, King Henry VII's Chapel, Westminster Abbey, and St. George's Chapel, Windsor. See TUDOR STYLE.

PERPETUAL MOTION. A body in motion continues to move unless acted on by a force. In this sense, perpetual motion is the normal state of affairs, but actually all moving bodies encounter resistance, and lose their energy and motion by doing work against it. Perpetual motion, as ordinarily understood, implies the continuous performance of work without the expenditure of energy. The creation of energy from nothing is impossible.

neither is it possible to draw energy continually from the surroundings, i.e. a ship cannot be made to move by using the energy of the sea. These two negative statements form the basis of the first two Laws of Thermodynamics, from which many far-reaching conclusions can be drawn.

PERSEPHONE, *per sef'one* A Greek goddess, daughter of Zeus and Demeter. With her attributes the Romans endowed Proserpine. See PROSERPINE.

PERSEPOLIS, *per sep'o lis* See PERSIA.

PERSEUS, *per' se us, or per' sūs.* In Greek mythology, the son of Zeus and Danae. When he was sent to slay the Gorgon

Medusa, Pluto lent him a helmet that made him invisible, Athena lent him her magic mirror, and Hermes furnished him with winged sandals. Armed in this manner, Perseus flew to the home of the Graeae, who alone knew where Medusa dwelt. The Graeae were three hideous sisters who had but one tooth and one eye, which they

used in turn. Unseen, Perseus snatched the eye as it was passing among them, and refused to return it till they told him where Medusa lived.

He found Medusa asleep, and, watching only her reflection in his mirror, he cut off her head. Then, holding the head out of his sight, he flew back. To Atlas, Perseus showed the head, and the giant, turned to stone, became a mountain range. On his way, too, he rescued Andromeda, who had been chained to a rock and left to perish and he married her. The head of Medusa he presented to Athena, who fixed it in the centre of her shield. At his death the gods placed him and Andromeda, with her mother, Cassiopeia, as constellations in the heavens. See MEDUSA.

PERSHING, JOHN JOSEPH (born 1860). Commander of the American Expeditionary Force in France in the World War. On being



PERSEUS
Group by Cellini before the
Palazzo Vecchio, Rome.
Photo. E.N.T.

appointed General by President Wilson he attained a rank held previously by only four Americans—Washington, Grant, Sherman, and Sheridan.

In 1921 Pershing was appointed Chief of Staff of the United States army. He retired in 1924 at the age of 64. He published in 1931 his reminiscences.

PERSHORE. See WORCESTERSHIRE.

PERSIA. Now officially called by its native name IRAN (which see), this ancient kingdom lies between the Caspian Sea and the Persian Gulf. It has an area of 628,000 sq. miles. The original inhabitants of the

from the Turks and Kurds, thus materially reducing their numbers.

Persia for a long time has had a national system of education. Private tutors are employed by the richer class. There are national schools where children are taught the Koran, and colleges giving instruction in religion and in the Persian and Arabic languages. There are two military colleges, and normal and polytechnic schools at Tehran. A Ministry of Education is building up a system of primary and secondary education along European lines.

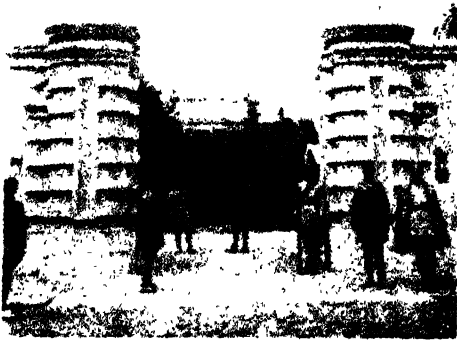
The Cities. The four principal cities of Persia which have present-day importance are—

Isfahan, incorrectly *Ispahan*, over 200 miles south of Tehran, the present capital. It is one of the oldest cities in Persia. During the reign of Shah Abbas, Isfahan was the capital, and reached the zenith of its splendour and prosperity, attaining a population of about

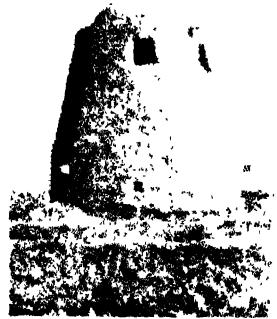
1,000,000. It was then the market-place of the East, having in its bazaars the riches and products of all countries, and at its Courts the princes and celebrities of Europe and of Asia. But in 1722 the Afghans captured and devastated the city, and it never afterward retrieved its former position. The seat of government was moved to Tehran in 1788. Notable among the buildings is the celebrated Mesjid-i-Shah, or royal mosque, a magnificent example of Oriental architecture. One of the most remarkable structures is the bridge of Allah Verdi Khan across the Zaindeh.

The town is of commercial importance and active industrially, the chief manufactures being pottery, arms, gold- and silver-ware, and cotton and woollen goods. Population (1933) estimated at 100,000.

Mesherd, or *Meshked*, is in the northern part of Persia. The city is surrounded by a mud wall, and entered through five gates. It is noted chiefly for its superb mosque. This contains the sacred shrine of Imam Reza, a descendant of the founder of the Shiites, and is visited each year by 100,000 pilgrims



PALACE OF THE SHAH
Photo: OROC



GUARD HOUSE IN PERSIA
A shelter for those who watch
the crops to protect them
from bandits.

Photo: Visual Education Service

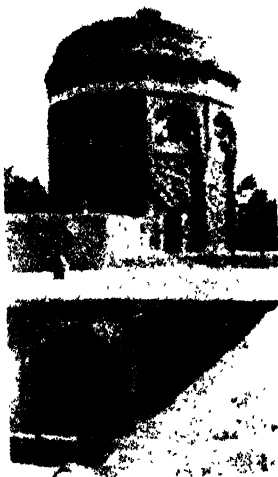
"Land of the Lion and the Sun" were the ancient Iranians. Though the Persians of to-day are of the same stock, their blood is mingled with that of the Mongol, Tartar, Arab and Turkish settlers. The present population is of two classes, the dwellers in towns and the roaming herdsmen. The latter class includes 260,000 Arabs, 720,000 Turks, 675,000 Kurds and Leks, 20,700 Baluchis and gypsies, and 234,000 Lurs, many of them outlaws and brigands. Total population (1933) about 15,000,000.

80 per cent of the natives are Mohammedans of the Shiite sect (see MOHAMMEDANISM). There are about 10,000 Parsees, 40,000 Jews, 50,000 Armenians, and over 30,000 Nestorians and other Christians; many of the latter sects suffered massacres

of this sect. Meshed is the centre of several caravan routes, which have declined in importance with the opening of the Russian

railway from the Caspian Sea to Samarkand. Meshed manufactures and exports rugs, shawls, silks, porcelain and sword-blades. Population, estimated at 139,350.

Tabriz, in north-western Persia, is the second largest city of the country, with a population of 219,000. Before the Caspian Sea became the commercial highway of the territory, *Tabriz* was the trade centre for Persia, India



MONGOL TOWER
A relic of twelfth century Persia.

Photo: Visual Education Service

and the Turkish and Russian dominions. There is still a large trade in rugs, shawls and dried fruits, mainly with Russia. The

rugs are among the finest produced in Persia. *Tabriz* is connected with *Julfa*, Russia, by a railway opened in 1916.

TEHRAN, formerly *Teheran*, the capital, lies at the base of a snow clad peak of the Elburz Mountains about 70 miles south of the Caspian Sea. Though it has developed as a typical Oriental city, with narrow streets and low, flat-roofed dwelling-houses, *Tehran* is gradually acquiring modern improvements.

Water conducted from the mountains through underground canals, provides the water supply. There is some manufacture of cotton, linen, carpets, ironwork and hats. Population of city and district, 360,350.

The principal seaport of Persia is *Bushire* (population 19,000, on the Persian Gulf, it is a British naval station and is on the air line to India).

Among the ancient sites are—

Persepolis, former royal metropolis whose splendour and magnificence were a source of wonder to the Greeks. Its site is marked by a series of ruins, including huge marble columns, vast portals, tombs and sculptured figures. It lay in the fertile valley of the River Medus, about 40 miles north-east of the modern city of *Shiraz*, and became the capital of Persia under *Darius I*. About 331 B.C., the city surrendered to *Alexander the Great*, who sacked it and massacred the inhabitants. By the sixteenth century, *Persepolis* had passed out of existence.



TEHRAN
Shah Abdul-asim Gate, one of the twelve city gates
Photo: OROC

Susa, an ancient city, once the capital of the province of Susiana, or ancient Elam, occupied a site on a plain in what is now the province of Khuzistan. During the reign of Cyrus, it was captured from the Babylonians, and when Darius I became king



NOBLEMAN'S HOME IN PERSIA
Photo: Visual Education Service

in 521 B.C., he made it the ruling city over the whole Persian Empire. The city is mentioned several times in the Bible in connection with Daniel and Esther, and in Scripture is usually called *Shushan*. From the time of Alexander, Susa gradually declined, until now the so-called tomb of Daniel, which is really a Mohammedan mausoleum, is the main landmark of the once famous city.

Physical Features and Climate. The greater part of the country is an elevated tableland 3000 to 5000 ft. high, broken by hills and enclosed on all sides but the east by a wall of bleak mountains—the Sarhad on the south-west, the Kurdistan Mountains on the north-west, and near the Caspian boundary the Elburz range, whose highest peak, Demavend, rises to 18,600 ft. The plains of the tableland are barren, and the surrounding

slopes have only a scanty covering of dwarf oak, cypress and walnut trees, but the valleys are made fertile by the melting mountain snows, and here is found a great variety of timber and plants. Most of the crops of Central Europe can be raised here.

Dense, humid, malarial forests border the shores of the Caspian Sea, while along the Persian Gulf, the tableland drops to a sandy plain, spotted with only a few patches of green oases. In the eastern part of the country, divided by a narrow ridge of hills and a caravan route, lie Persia's two desert areas—the Great Salt Desert, a bed of rock salt covering 600 sq. miles, and the Great Sand Desert.

In the central highlands there are a few streams flowing into inland lakes or losing themselves in the sand. The only rivers of any size are the Karun, now opened up to the Persian Gulf, and the Sefid Rud, emptying into the Caspian Sea. Only the Karun is for any distance. Persia has three large but shallow salt lakes—Seistan, east of the Kerman Desert, Urmia or Riziaiyeh in the north-west, and Niriz in the south.

In summer there are different types of climate between the cold mountain peaks, the clear, dry heat of the tablelands, and the sheltered, warm valleys below. The shores of the Caspian are tropically hot and humid, and along the Persian Gulf the dry heat is such that even the scorching gulf winds give relief. In this region, the heat lasts throughout the year, but the eastern plains are bleak during the winter months.

Industries. Much of the arable land is not



PERSIAN BOY
Photo: OROC



PERSIAN ART

Hawking and Hunting Scene from ancient manuscript.

Photo: I. Ali Shah

utilized, and the means of tillage are primitive. Only with the aid of irrigation is agriculture possible in most parts. Cereals, peas,

beans, sugar cane and indigo are grown, and large quantities of fruits, gums, cotton and Persian tobacco are exported. In the northern provinces, along the Caspian Sea, rice-growing is the principal industry.

The natives not living in cities are chiefly a pastoral people, keeping large herds of goats and sheep famous for their fine wool. The Persian horses are famous in Asia and the camels of Ilkhrasan are noted for the loads they are able to bear.

There are no large factories. The famed silk and woollen tissues and the Kerman shawls of goat's hair are woven—and enamelled filigree work is produced—by hand. Most important of the manufactured exports are the hand-made Oriental carpets of thirty different kinds, each district of the country having its characteristic pattern and colours.

Nearly 40 per cent of Persia's total trade is carried on with the British Empire.

Mineral Resources. The mountains contain great but undeveloped mineral wealth. The tin, iron, copper, lead and coal of the north-west and central regions, and Kerman's borax, manganese and marble are neglected to a great extent because of the difficulties and high cost of transport. The turquoise mines of Nishapur have been worked from ancient times in a most primitive fashion, but with success. Rock-salt pits are abundant.



VILLAGE HEADMAN

Photo: I. Ali Shah

There are three main oilfields, with an annual production of over 49,000,000 barrels, and several pipe-lines in Persia. The terminal for the pipe-line is at the refinery in Abadan, a port at the head of the Persian Gulf. In 1901 the Anglo-Iranian Oil Co. was granted a sixty-year oil concession in return for royalties. The lease covered about 500,000 sq. miles.

Transport, Communications. Most of the trade routes of Persia are narrow camel paths crossing the rough mountainous country into Russia, Afghanistan and India. A highway for wheeled traffic, extending 217 miles from Resht, on the Caspian Sea, to Tehran, was built in 1899 by Russia, and another, 91 miles long, between Shushtar and Ahwaz, was constructed by the British in 1900. Since the World War, passable motor roads have been constructed all through the country.

Persia's railways are few, and total 334 miles. This includes six miles between Tehran and one of its suburbs, 85 miles from Tabriz to Julfa; and 180 miles between Ahiabad Shahi and Bander Shahi.

A railway to connect the Caspian Sea and the Persian Gulf has long been contemplated. In 1928, concessions were granted several German and American companies to start actual construction of this line. It will be about 900 miles in length. After the completion of 159 miles (Bander Shahpur to Dizful) the Persian government decided to finish the project independently. Since 1925, regular air service has been maintained throughout Persia.

Merchandise is carried by steamship to Russian ports across the Caspian, and to English and Indian ports by way of the Persian Gulf.

Literature. This has been almost the major contribution of Persia to the world. The *Gathas*, the earliest portion of the Zend-Avesta, or sacred book of Zoroaster, bear a close resemblance to the Sanskrit of the *Irig-Veda*. The great Persian epic, the

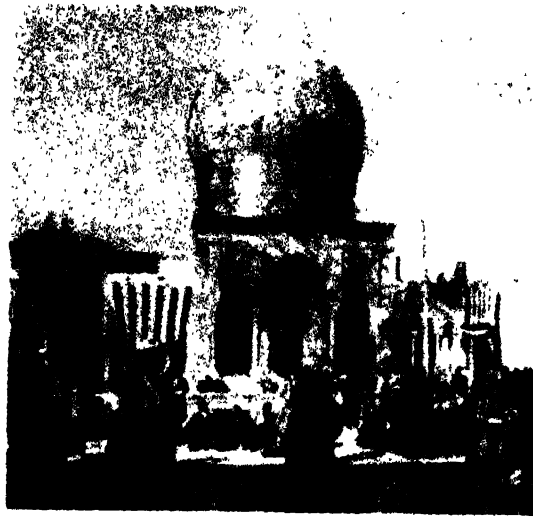
Shahnameh, or "Story of the Kings," was composed by Firdausi to praise deeds of valour of Persian antiquity (940-1020).

A mystic in both religion and literature, the Persian has contributed a great part of the mystic poetry of the Orient. Jalaluddin Rumi (1207-1273) in his *Masnawi*, and Sa'adi in his *Odes*, typify this form of verse.

Omar Khayyam, the exponent of Sufism, has attained an enduring popularity among English-speaking nations because of Fitzgerald's translation of his quatrains into English verse. See OMAR KHAYYAM.

History and Government.

Persia, next to Egypt and China, is the oldest country in the world. Of the early history we have only legends, and the Greek writers supplied the first written accounts, which show many contradictions. The northern part of the Iranian plateau was occupied by the Medes, who in 633 B.C. conquered the Persians and Assyrians. At the end of that century, however, Cyrus the Great



SHRINE AT QUM, NEAR TEHRAN
Photo: I. Ali Shah

of Persia conquered Media, and founded a mighty empire extending from the Oxus and Indus rivers to the Mediterranean. His son, Cambyses II, the Tyrant, added Tyre, Cyprus and Egypt to the empire, but Darius I, in an attempt to extend the empire over Greece, was defeated at Marathon in 490 B.C.

Darius originated the Eastern system of government, dividing the country into provinces, over each of which was placed a *satrap*, responsible to the king. Xerxes I, with an army and fleet greater than any that had previously existed, invaded Greece but was defeated by the Greeks at Salamis in 480 B.C. and at Mycale and Plataea in 479; these defeats shattered Persia's hope of supremacy in Greece and in Europe.

In 330 B.C., Alexander the Great conquered Persia, and it remained under Grecian rule for a century. The kingdom then passed successively into the hands of the Saracens and the Turks, and in 1251 it was conquered by



the Mongols under Genghis Khan. A century later, it became a part of the empire of

ment was established, and in 1907 the throne was given to Ali Mirza.



SAVING WOMEN IN EASTERN PERSIA
They are baking bread in a mud oven.
Photo. Visual Education Service

Timur, only to be divided among his sons and invaded by the Turkomans after his death. By the sixteenth century, Shah Abbas had reunited the kingdom, and prosperity continued for a hundred years, when civil war again broke out.

In 1795 unity was restored by Aga Mohammed, who added Georgia and Khurasan. Later, coming into conflict with Russia on the Caucasian frontier and the Caspian Sea, Persia lost several districts along the Kur, and Georgia in 1801. In 1813 Daghestan, Shirvan and Baku, and the rights of navigation on the Caspian Sea were ceded to Russia. In 1826 Russia was given Persian Armenia and an indemnity of £1,250,000. To pay this sum required heavy taxation, which led to an insurrection in 1829, when almost all at the Russian Legation were murdered by a Persian mob. As a penalty, Russia exacted further concessions.

Internal dissatisfaction continued, and in 1834, assisted by Great Britain and Russia, Mohammed Shah obtained the crown, but he and his son, Nasr-ed-Din, came into conflict with Britain for encroaching upon Afghan territory. In 1870 Russia recognized Persia's jurisdiction over the strip of land north of the River Atrak. Nasr-ed-Din was assassinated in 1896. In 1906 parliamentary govern-

The Constitution adopted in 1906 provided that the Shah, formerly an absolute monarch, should be assisted by a Ministry headed by a Premier. The finances were to be administered by a Parliament (*Majlis*), so that the Shah might not convert to his own use subsidies from other countries. This measure was unpopular with the Shah and his party. In 1909 the Shah forced the Cabinet to resign, but the Nationalists were victorious in the civil war that resulted, and the Shah was deposed. His son, Ahmed Mirza, a boy of eleven, was proclaimed ruler, and the country was administered by a regency until 1914, when the Shah became of legal age.

By an Anglo-Russian treaty in 1907, which was a diplomatic step to bring about a *triple entente* with France to check the power of Germany, the country was divided into three spheres of influence. The Russian extended over 305,000 square miles along



WEAVING REED MATS
In the background a travelling barber is at work.
Photo. OROC

the Russian frontier; the British covered 137,000 square miles on the western frontier. Britain and Russia agreed to respect the

integrity of Persia and to aid in the administration of finances.

The Bolshevik revolution brought about the cancellation of Russo-Persian-British agreements, and Russia ceased to exercise her influence.

Increased ill-feeling toward Great Britain compelled the British to evacuate Kazvin in 1921, and in the autumn of the same year, the British controller of finances left the capital.

In 1927, Russia and Persia signed a pact of neutrality and non-aggression which provided that neither should send armed forces into the territory of the other and that each should remain neutral should the other be attacked by a third Power. The Caspian Sea fisheries, under a twenty-five-year agreement, were to be enjoyed jointly by the two countries through a company headed by a Persian.

In 1925 the young monarch was deposed, and in his stead Riza Khan, commander-in-chief, was chosen Shah by the National Assembly. He is assisted by a Premier and eight Ministers of State, and his powers are restricted by the Parliament of 120 members and laws of the Mohammedan religion. In 1932, Persia concluded two treaties with Turkey, establishing friendly relations and neutrality. The development of the country's resources is steadily proceeding under native managers and officials, who have tended to replace foreign advisers. Persia is a member of the League of Nations.

PERSIAN GULF. An arm of the Indian Ocean separating Persia from Arabia, and connected with the Gulf of Oman by the Strait of Hormuz. Including its islands, the Persian Gulf has an area of about 90,000 square miles; its greatest length is 520 miles, and its average breadth 180 miles. The principal ports are Bandar Abbas, Bushire, and Lingeh, in Persia; Kuwait, in the sultanate of that name in Arabia; and Manama, chief trade centre of the Bahrein Islands. The Karun River, at the head of the gulf, has been opened to navigation as far as Ahwaz, Persia. The principal islands in the gulf are the Bahrein group—noted for their pearl fisheries—and Qishm; iron, coal, salt and lead have also been found here.

PERSIMMON, *per sim' on*. One of a group of fruit-bearing trees belonging to the ebony family. The common persimmon is to be found in many parts of North America. It is of graceful appearance, not usually growing higher than 30 ft., and bears shiny green leaves, small yellowish-green flowers, and an orange-yellow fruit, also called the "date plum." The wood of the tree is very hard, tough, and fine-grained, and is used largely for the heads of golf clubs. Persimmon trees are propagated by budding and grafting.

The other species, the *black persimmon*, bears fruit which is black and insipid, but of value because of dye obtained from the juice. The wood, too, is black, sometimes with yellow markings, and is used to a limited extent for engravers' blocks.

The Japanese and Chinese cultivate varieties of persimmon that bear fruit larger than,



PERSIMMONS
Photo Visual Education Service

and much superior to, the American. In Japan, persimmons are dried for the market.

Scientific Names. Persimmons belong to the family *Ebenaceae*. The common persimmon is *Diospyros virginiana*, the Black is *D. tenebra*, the Japanese is *D. kaki*.

PERSIUS (ANTONIUS PERSIUS FLACCUS). A Roman poet, born in Etruria in A.D. 54. He was of high lineage and of noble conviction. At the age of 12 he removed to Rome. He was before long on intimate terms with all the most remarkable literary men of the time, including Lucan. He died in A.D. 64, at the age of 28, having already achieved considerable fame as a poet. His reputation as a poet of eminence rests mainly on six satires. Though Persius may have imitated the manner of Horace, he did not imitate the style—where Horace is simple to extreme. Persius is full of strange laboured phrase and images, catchwords, outlandish metaphors, and all the tricks of the rhetorician. To simple tastes, while there can be no doubt that there is real force in his poetry, Persius remains a poet more of promise than of performance.

PERSON. In grammar, pronouns which stand for the person speaking are said to be in the *first person* (*I, us, etc.*); those which stand for the person spoken to are in the *second person* (*thou, you, etc.*), and those which stand for the person or thing spoken about are in the *third person* (*he, they, etc.*). All nouns, except those in the vocative case (i.e. naming a person or thing addressed), are in the third person. A verb is of the same person as its subject.

PERSONALITY. Mental differences that distinguish one individual from another may often be recognized even from birth. One infant may be quiet and placid, another restless. Such differences of type, which seem to exist at birth and persist throughout life, are often spoken of as differences of temperament. We do not know very much

about them, but it seems possible that they are connected with the balance of the secretions of the endocrine glands. Abnormal functioning of these glands may be associated with abnormalities of temperament, as occurs, for example, in cretinism or exophthalmic goitre. See ENDOCRINE GLANDS.

In their innate or temperamental make-up, individuals are often distinguished as being stable or unstable. The unstable person is one who readily behaves abnormally or succumbs to neurotic or psychotic illness when life becomes difficult. We may find people of a stable type passing through the most difficult circumstances with comparatively little harm. Much discussion has turned upon the question of how far an unstable temperament is inherited from the parents. Certainly many unstable individuals have unstable parents, but inheritance is not the only factor to be considered. The unstable parent certainly influences the environment of the child.

A classification of psychological types which has aroused considerable interest is that which distinguishes *extroverts* and *introverts*, with an intermediate type between them. This owes its origin to Professor Jung. The extrovert is supposed to be the person who turns his energies outward, is interested in people and social affairs, observes what happens around him and shuns reflection, self-observation and solitary occupations. The introvert would have the opposite characteristics, being more reserved and reflective with a tendency to solitary occupations and day-dreaming. In actual practice we seldom find pure types, and it is somewhat doubtful whether the distinction is a fundamental one.

Another division that is sometimes made is that into *cycloid* and *schizoid* types. This corresponds, in the realm of the normal, to the distinction that is made between two important forms of insanity, cyclical (or manic-depressive insanity) and schizophrenia (or *dementia praecox*). People of the cycloid type are those whose moods change a great deal, who swing rapidly from cheeriness and gaiety to low spirits and depression. Cyclical insanity represents the morbid extreme of this type, the mood changing from the elation of mania to melancholic depression, with suicidal tendencies. The schizoid type, on the other hand, shows little variation in mood and tends to withdraw into himself and show comparatively little emotion about what is happening around him. In extreme cases, he may appear entirely emotionless and apathetic.

Other types among normal people have been distinguished through a study of the neuroses. The best defined of these is the

obsessional type. People of this type, should they become mentally ill, would be expected to succumb to an obsessional neurosis. Among their characteristics would be preciseness, orderliness and a tendency to pedantry and prudery. They tend to be careful and sparing with money and possessions. They often tend to avoid marriage and the company of the opposite sex.

It will readily be seen that there is a good deal of overlap in the various classifications that have been put forward. Most people would have to be assigned to intermediate groups.

Apart from the rather broad tendencies that have so far been considered, individuals differ a great deal in the relative strengths of their instincts. Some are naturally more fearful, others more aggressive. In some, behaviour is determined to a large extent by parental, protective impulses. In some people we feel that the sexual instinct is exceptionally strong. With some individuals the impression is gained that the instincts and emotions generally are powerful. The theory has been put forward tentatively that there is a general factor of emotionality, those people who experience one kind of emotion with full force tending to experience the others in like manner.

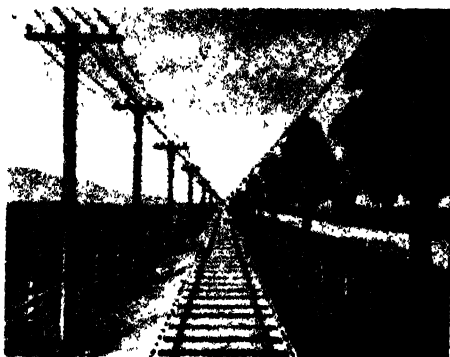
Of equal importance in determining behaviour is the method adopted to control instinctive emotional drives when their direct satisfaction is impossible. Some people are able to divert a large part of their frustrated instinctual energy to new and useful ends (See SUBLIMATION.) In others this energy is more wholly kept from expression on the surface. People differ, too, in the extent to which they colour their view of the world according to their own feelings, or absorb into themselves the ideas and attitudes of those around them. Sometimes instinctive tendencies are countered by setting up the very opposite line of behaviour. The person who is inwardly fearful may even unconsciously attempt to master this by a show of aggressiveness. Thus, while the strength of the instincts may differ from individual to individual, so too may the mechanisms that operate when their direct issue in action is prevented. In this the strength of the moral tendencies and of conscience is extremely important. See INSTINCT.

PERSONIFICATION. A figure in rhetoric in which life is attributed to inanimate objects or to abstract notions. The Psalmist used personification when he wrote, "The heavens declare the glory of God" (Ps. xix. 1).

Personification cannot always be distinguished from metaphor, which is founded on the resemblance of one thing to another.

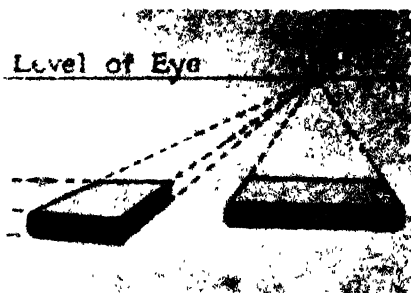
Such an expression as "the raging sea," for example, could be considered as either metaphor or personification. See METAPHOR.

PERSPECTIVE, *per spek' tiv*. The art of representing objects upon a plane surface as they appear in space to the eye. The science of perspective is based upon certain



PERSPECTIVE

fundamental facts. One of these is the apparent decrease in the size of an object as the distance between it and the observer increases. Another basic fact is the apparent gradual decrease in size of objects of like dimension which stand at different distances from the observer. This is illustrated by Fig. 1, which shows a line of telegraph poles. Again, two parallel lines of poles or the two parallel rails of a railway track appear to converge as they recede from the eye, and finally to meet at the *vanishing point*. The appearance of objects is also affected by the position of the observer; that is, according



PERSPECTIVE

to whether the objects are on a level with the eye or are above or below it.

The rules for perspective can be easily understood by studying a cube, box or other similar object (see Fig. 2). All of the lines (forming the edges) which have the same direction belong to a group or *system*; each line is an *element* of the system. Each

system has its own vanishing point, and all the lines of a system seem to converge toward the vanishing point of the system. Any system which vanishes upward will have the vanishing point above the observer's eye, and *vice versa*. The vanishing point of a system of horizontal lines will be on a level with the eye, and that of a system of vertical lines will be vertically in line with the eye. All horizontal lines have their vanishing points in the horizon, as is illustrated by Fig. 1.

PERSPIRATION. A colourless liquid secreted by glands in the skin. Over 99 per cent is water, but it contains also small quantities of urea, sodium chloride, and other salts. Distributed over the body are about two and a half million sweat glands, which, day and night, are discharging their contents upon the surface of the skin. The skin is thus important in eliminating waste products and in regulating the temperature of the body. Perspiration which evaporates as fast as it is secreted is known as *insensible* perspiration, *sensible* perspiration is that which accumulates in drops on the surface of the skin.

The dog has sweat glands only in the sole of his feet. The moisture that we eliminate in perspiration he rids himself of in his "panting."

The amount of perspiration discharged varies in healthy persons from 25 to 71 oz. a day, but exercise and a high temperature cause an increase in the amount excreted. In warm weather, the evaporation of large quantities of perspiration helps to keep the body cool. In health, the flow of perspiration and rate of evaporation are maintained in that proportion needed to keep the temperature of the body at the normal point of 98.4° F. See SKIN.

PERTAB SINGH, SIR (1844-1922). Born of a long line of soldiers and sportsmen, Sir Pertab Singh personified the finest Rajput traditions. In 1895 he became Regent of Jodhpore for his young nephew, a duty he was to undertake for his grand-nephew in 1911 and again on the latter's death in 1915. He was Maharajah of Idar from 1901 until his abdication in 1911. As a ruler he showed firmness and generosity, being friendly to reform but tactful in its application. His soldiering included the Tirah campaign of 1897 and the Boxer rising of 1900, when he commanded the cavalry of his own state. Perhaps one of his bravest deeds, however, was that recorded by Sir Henry Newbolt, when he disregarded ritual defilement to assist at the burial of a British officer, his brother-at-arms. When the World War broke out, although he was then seventy, he offered his sword to the King-Emperor and

again commanded the Jodhpore Lancers in France and in Palestine.

PERTH. This Burgh and county town of Perthshire, with a population of 34,807 in 1931, was according to some authorities

Destiny at Scone, which is now in Westminster Abbey. Many Scottish kings have made their residence in the Palace, but the present building is mainly modern. Perth Castle was destroyed by flood in 1210.

PERTH, AUSTRALIA. See WESTERN AUSTRALIA.

PERTHITE. A minor gem, named after Perth, Ontario, where it was found. It is a mixture of orthoclase and albite.

PERTHSHIRE. A central county of Scotland with an area of 1,617,808 acres. Its population according to the 1931 census was 120,772.

Physical Features. By Sir Walter Scott Perthshire was named the most varied and the most beautiful of all the provinces of Scotland. Three parallel longitudinal divisions may be noted running from north-east to south-west. The largest is that portion occupied by the central mass of the Grampian Mountains, which enter the county in the north-east by Carnwell as a narrow strip, and toward the south-west broaden until they occupy the greater part of the county. The summits attain an almost uniform elevation of 3000 ft. and upward, and comprise a great plateau with deeply eroded valleys; while on the south the hills rise with sudden abruptness from the Lowlands. The valleys of the Grampians form two systems. That of the Tay and Tummel runs south from Blair Atholl to Dunkeld, the others, including Glen Garry, Glen Rannoch, Glen Lyon, Glen Dochart and Glen Lochay, being transverse to it and terminated by it. Most of the highland region is moorland, but there are numerous plantations of fir and larch. Most of the great deer forests of Scotland are situated here, the Forest of Atholl covering 35,000 acres. The valleys contain waterfalls, cascades and mountain torrents, many of which rush for miles over boulders of glacial origin. The highest peaks are Ben Lawers, 3984 ft.; Ben More 3843 ft.; Ben Lui 3708 ft.; Ben Glloe 3671 ft.

The second division is the Vale of Strathmore with a breadth of 10 to 14 miles—one of the most fertile stretches in Scotland, generously dotted with farms and villages—and well watered by the Tay and its tributaries. This is the breeding-place of thousands of head of cattle, and a country rich in grain. The final division is the belt of the Ochil and Sidlaw Hills hemming in the



PERTH

Top: Across the Tay. Bottom: High Street.

Photos: Taylor

founded by the Roman legions in the time of Agricola. Certainly it was created a burgh by William the Lion in 1210, whilst the town records have been preserved since 1431. It has a good harbour, and from the purity of its water supply has become world-famous as a centre of the dyeing industry. Carriage building has been of importance for over a hundred years, whilst there are also linen manufactories and other textile industries.

Scone Palace is the seat of the Earl of Mansfield. This is on the site of the capital of the kingdom of the Picts and of an abbey of the early fourteenth century. The kings of Scotland were crowned on the Stone of

Vale of Strathmore on the south, and divided from each other by the Vale of Tay where the river breaks through the hills by the town of Perth. Unlike the Grampians, they are cultivated sometimes to their summits, and elsewhere covered with an ample growth of timber and scrub. King's Seat and Black Hill exceed 1200 and 1100 ft. respectively. There remains the narrow alluvial tract bordering the Firth of Tay known as the Carse of Gowrie.

The Tay, the longest river north of the border, rises on the Argyllshire boundary, flows east through Loch Dochart to Loch Tay, then north-east along the curving Strath Tay, whence it flows south through Dunkeld and across Strathmore to Perth, finally entering the Firth of Tay, after a total course of nearly 120 miles. Its tributary rivers and streams include the Tummel, the Brean, Isla and Almond. In the south are found the headwaters of the Forth in the country of the Trossachs and Loch Katrine.

History and Antiquities. Perthshire rose to fame as the centre of the early history of Scotland. Most of its historic events are concerned with the town of Perth. The site of the Battle of *Mons Graupius* where, according to Tacitus, Agricola won his final victory over the Northmen, is placed within the county. The Roman legions, on first viewing the Tay from the Sidlaw Hills, welcomed it as a second Tiber. In the dark ages Abernethy was the capital of the kingdom of the Picts. Later, Scone attained a new importance as the coronation place of Scottish kings, and Dunkeld was the chief episcopal see of the North. 1297 was the traditional date of the capture of Perth by Sir William Wallace. The coronation of Robert Bruce took place according to custom at Scone. 1311 witnessed the capture of Perth by Bruce. The assassination of James

I was also enacted at Perth. Here, too, was the scene of the religious disturbances of 1559 and of the Gowrie Conspiracy of 1600. In 1644, in the Covenanter's rising, it was captured by the Marquess of Montrose. The Battle of Killiecrankie, which sealed the fate of the Jacobites, took place in 1689, whilst in the Battle of Sheriffmuir, 1715, an indecisive engagement was fought which, nevertheless, hindered the cause of the Old Pretender. Finally, the innumerable legends which surround the figure of Rob Roy are mainly connected with the Highlands of the county.

Flint and bronze weapons have been discovered in many places, particularly on the high ground. Similarly, many hill forts and stone circles may be seen. The Roman camp of Ardoch is one of the largest and best preserved in Scotland. Monoliths and sculptured rocks are frequent, as are the beautiful Celtic monuments. In particular may be mentioned one at Meigle and another at Glen Carse. The round tower of Abernethy, 74 ft. in height, is one of the two remaining early Christian watch-towers in the country.

Doune Castle, Elcho Castle, Kinclaven Castle, Kinnaird Castle and Garth Castle are a few of the most notable strongholds. Scone Palace takes pride of place among modern residences.

Agriculture, Industries. Except in the county town, agriculture remains the staple occupation. In the highland areas cultivation is confined to the valleys, and even here the soil is unsuitable for the production of cereals. Cattle of the Argyllshire breed, however, flourish exceedingly well. Huge flocks of black-faced sheep are common. The two great agricultural districts, the Vale of Strathmore and the Carse of Gowrie, combine pasture and arable land in almost equal proportions. The principal crop is oats, followed by barley and wheat. Green



KILLIECRANKIE

Photo: Scottish Travel Association

crops are successfully raised on a wide scale.

Remains of the ancient Caledonian forest are still to be found in some parts of Breadalbane and Monteith, but, despite the attempts at afforestation by many large landholders in the nineteenth century, comparatively little of Perthshire is heavily wooded. There are, however, some deer forests of material size. There are also extensive grouse moors.

Much of the arable land is held in farms of under fifty acres in extent and there are altogether rather more than 4000 holdings. To the absence of manufacturing industries is due the purity of the lochs and streams, which abound in fish, principally trout and salmon.

Industry is represented by cotton and woollen manufacture, both of which are at the present time depressed. Jute and linen manufacture and dyeing are the principal occupations of the county town (see PERTH). Quarrying and mining are on a small scale, but the slate quarries of Aberfoyle were worked at a profit until recently.

Perth is a Royal Parliamentary Burgh. Small Burghs are ten in number; Aberfeldy (population 1505), Abernethy (population 595), Alyth (population 1662), Auchterarder (population 2254), Blairgowrie and Rattray (population 4676), Callander (population 1572), Coupar-Angus (population 1883), Crieff (population 5544), Doune (population 822), Dunblane (population 2692 in 1931).

PERTURBATION. In astronomy, the variations in the motions of heavenly bodies. The planets move in well-defined, slightly elliptical orbits around the sun, influenced chiefly by the gravitational force of that body. But, in addition to the sun's attraction, the planets are affected by the attraction of other planets or of their satellites, and this added force causes variations in the planetary orbits. The moon's attractive force causes perturbations in the earth's motion. See GRAVITATION.

PERU. This South American republic, bordering the Pacific Ocean with a thousand mile coast-line, has an area of 482,616 sq. miles.

The People. Peru had an estimated population of 6,147,000 in 1927; of this number half are pure Indians, and the remainder are evenly divided between the whites of unmixed blood (chiefly Spanish) and the *mestizos*, or mixtures of European and native stocks. The whites represent the culture of Spain; and the Spanish language is spoken with a purity unequalled elsewhere in America. The Indians, who are descendants of the Quichuas (Incas), are farm labourers

or shepherds. The *mestizos* are miners and drovers. Large numbers of negroes were brought to Peru by the early viceroys, and they mingled with the Quichuas. Their mixed descendants are called *sambos*.

The Cities. There are several cities of populations between 15,000 and 30,000, but the larger ones of chief importance are the following—

Arequipa, an old city that has been conspicuous in the history of Peru. Situated



MARKET AT CERRO DE PASCO, PERU
Photo: U. & U.

8000 ft. above sea level, it is one of the best-built cities in South America. The people are employed chiefly in the making of jewellery and the cutting of precious stones. The city is the centre of trade for the interior. It was founded by Pizarro in 1540. In 1600 and again in 1868, it was nearly destroyed by earthquakes. Population 76,000 (1931).

Callao, the chief port, is the shipping point for Lima, the capital, which is seven miles east. The harbour is excellent. Its importance has been greatly increased by the Panama Canal, which brings it relatively near to North Atlantic ports. There is some manufacture of iron and sugar-refining, but Callao is chiefly a trade centre, exporting sugar, cotton, wool, hides, minerals, cocoa, etc., and importing manufactured cotton and wool, iron and steel.

Callao figured in the pirate activities of the sixteenth century, and in the early



HARVESTING IN PERU

To separate the grain from the chaff, both are tossed in the air and the wind carries the lighter chaff away whilst the heavier grain falls to the ground.

Photo: U. & U.

Spanish conquests. Earthquakes shook the city in 1630 and 1746, the latter of which destroyed it. Callao was rebuilt and strongly fortified, and remained the last foothold of Spain on the continent until 1826, when the Spaniards were driven out. In 1881 Chile occupied the city, but Peru regained it two years later. Population, 77,728 (1931).

Cuzco, officially *Cusco*, a city far inland, is in the centre of a fertile agricultural district in the Andes, at 11,300 ft. above sea-level. Manufactures of woollen and cotton goods, sugar, embroidery and leather are carried on. Cuzco was founded in the eleventh century, and at one time was the capital of the empire of the Incas. The ancient city was stormed and destroyed by Pizarro in 1535, but remains of its former glory are seen in the palace of the Incas and a mighty Temple of the Sun. In 1927 engineering works were completed which bring adequate water supplies from a distance of twelve miles. Population, estimated, 40,000 (1931).

LIMA, the capital of Peru, is famous as the former capital of all Spanish South America. It was founded by Pizarro, the Spanish

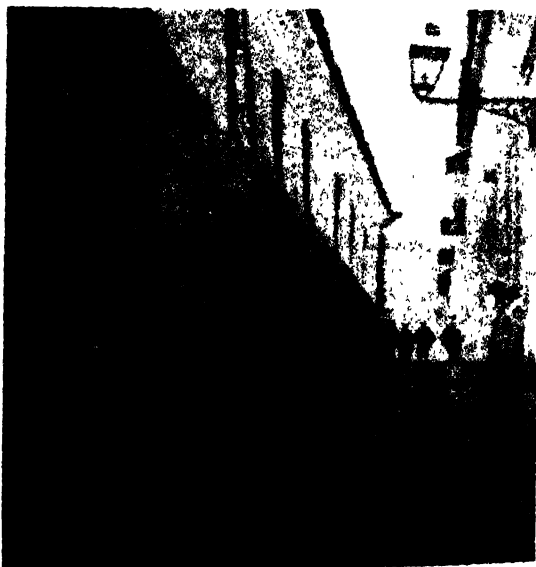
conqueror, in 1535, and named by him the "City of Kings."

The city has suffered periodically, since 1683, from earthquakes, that of 1746 being especially destructive. The houses as a rule are built of stucco-covered adobe, several feet thick, to make them earthquake-proof.

The oldest university in America, that of San Marcos, founded in 1551, is situated here. The city is widely known for its manufacture of cotton and woollen textiles, sugar and cocaine and for its marble factory.

The retail trade is largely in the hands of Italians and Chinese. The population is 316,000 (1931), including suburbs.

Physical Features and Climate. Two ranges of the Andes cross Peru from north to south, dividing the country into three distinct regions. The edge of the coast strip is mostly desert, covered with shifting sand dunes, where agriculture is made possible by extensive irrigation, since the winds (from the east) part with their moisture when passing the cold mountain tops. Back from this strip in the foothills of the mountains are fertile valleys in which are situated the main cities. Between the mountains is a region of plateaux, varied with deep valleys and lofty summits; in the main, the climate is mild and healthy. East of the mountain region lies the "montaña," a tropical zone watered by many rivers, including the head waters of the Amazon, and covered with thick



A PERUVIAN TOWN

The lower part of the walls dates from the time of the Incas.

Photo: Krydon

forests. The condor, llama, fox and deer are found in the mountain regions; the monkey, alligator and tiger in the tropical districts. The Andes reach great altitudes in Peru, where there are seven peaks over 19,000 ft high. The montaña zone is practically undeveloped.

Resources, Industry, Education. Peru is a vast storehouse of minerals, still scarcely exploited, yet constituting the chief source of the country's wealth. Copper and petro-

The forests, not yet fully exploited, yield rubber, cinchona and dyes, and the mountain valleys afford grazing for the alpaca, sheep and llama. Sugar and cotton comprise the chief manufactures. The Indians are noted for the manufacture of straw hats, sold as "panamas."

Roads and railways are being rapidly constructed, the government controls about 640 miles of railway, and about 2160 miles are privately owned. Travel by pack mule



AREQUIPA

This city stands 8000 feet above sea level

Photo U. S. G.

leum are most important, followed by silver, gold, lead, zinc, coal and vanadium. Cerro de Pasco is a famous mining region. There are also marble quarries. Guano, for fertilizing, is a source of wealth, and sulphur is exported in considerable quantities.

The leading agricultural products of Peru are sugar, cotton, wool, hides and skins. Wild rubber collected in Peru was formerly an important export, but with the cultivation of rubber, this industry languished. Irrigation is necessary to agriculture in many regions. Cocoa cultivation is being extended, and the manufacture of wines is becoming important. Coffee, tobacco, Indian corn, wheat and ramie are cultivated in the higher regions. Here, also, is the original home of the potato. In the southern part of the country sheep are pastured for their wool.

is still the only means of transport in the more mountainous and in the vast forest regions. The seaports are generally supplied at least with short lines into the interior.

Elementary education is free and compulsory between the ages of 7 and 14. There are 27 colleges, various high schools, and institutions of applied science.

Nearly all the inhabitants are Roman Catholic and this Church has special privileges, but there is complete religious liberty.

Government. By the constitution of 1933, legislative power is vested in a Senate and a Chamber of Deputies. President and Chamber are to be elected every five years. All males are to be elected every five years. All males of 21 who are not illiterate have a vote. The President, aided by Cabinet of seven, has executive powers.

History. For about three centuries, Peru

was the centre of a vast empire, ruled by the Incas (see INCA). That this ancient Indian civilization had reached a high degree of development is evident from the ruins revealed by recent expeditions. With the coming of the Spaniards, led by Pizarro in 1532, the Inca empire was overthrown, and the people were reduced to slavery to satisfy the conquerors' thirst for gold. Pizarro, a combination of ambition and brutal ferocity, was assassinated in 1541.

Though Spain contributed much in the way of culture and prosperity, its hand was heavy, and Peru sought to win its freedom in the general movement for independence in Spanish America. The Spanish power in Peru was finally overthrown in 1824.

For twenty years after independence was gained there was constant strife between factions under ambitious leaders. In 1849, however, Ramón Castilla, Peru's greatest President, came into power, and for the next twenty years, Peru made marked progress. In the war with Chile (1879-1883), Peru lost its valuable nitrate province, Tarapacá, and the dispute over Tacna and Arica was settled only in 1929. Peru was awarded Tacna and control of the railroad between Tacna and Arica. In 1933, Peru and Colombia went to war over the boundary in the Upper Amazon Valley, but the League of Nations successfully intervened.

PERUGINO, *per u jé' no*, PIETRO (1446-1524). An Italian painter and representative master of the Umbrian school. He was one

of the first of the early Italians to adopt with success the Flemish method of oil painting, and none of his pupils, except Raphael, attained the purity of colouring which is characteristic of his art. His real name was PIETRO VANNUCCI. He was born at Citta della Pieve in Umbria, and accomplished most of his work in the neighbouring city of Perugia,



PERUGINO
(Self-portrait)
Photo: Mansell

whence his traditional name. In 1483 Pope Sixtus IV called him to Rome, where he was employed with other famous artists in decorating the Sistine Chapel with frescoes. Perugino's fresco "Christ Giving the Keys to Peter" is the best of those still visible. His altar-piece in the National Gallery, London, was originally painted for the Certosa Convent at Pavia.

PERUVIAN BARK. The bark from several trees of the cinchona family, valuable for the quinine it contains. For a description of the trees, see CINCHONA; for the drug, see QUININE.

PESCADORES, Tlle. See JAPAN.

PESETA, *pé say' ta*. The monetary unit of Spain. At par it had the same value as the French *franc* or the Italian *lira* before the World War, equivalent to ninepence-halfpenny in English money. One peseta is worth 100 centimos. Gold coins having the value of five, ten, twenty and twenty-five pesetas are made, and silver coins having the value of fifty centimos and of one, of two and of five pesetas.

PESHAWAR, *pesh ah' war*. Capital of the North-West Frontier Province (which see) in British India.

PESO, *pay' so*. Originally, the name of the old Spanish dollar, called *peso de oro*, or *peso de plata*, according as it was coined of gold or of silver. In Spain the standard of value is now the peseta (which see). In most of the states of South and Central America, as well as in Mexico, the silver peso or dollar is still the standard, though varying considerably in value.

PESSIMISM. The philosophical principle which holds that there is more bad than good in the world and more pain than pleasure. In its contention, therefore, that the world is essentially evil, it is the opposite of *optimism*. Strictly speaking, pessimism is more a personal attitude than a philosophy. Schopenhauer was the most famous of those who have adopted the pessimist view. See OPTIMISM.

Derivation. The word *pessimism* has come into the English language from the Latin *peissimus*, worst.

PESTALOZZI, *pes ta lot' se*, JOHANN HEINRICH (1746-1827). Educational reformer, born at Zürich, Switzerland. His father died when Johann was five years of age, and he was brought up by his mother. He was a shy, delicate and awkward boy, and his early training tended to emphasize these characteristics.

He first decided to be a minister, but abandoned that plan to follow the law. His health being broken by hard study, he settled on a farm at Neuhof, in Aargau, which he later converted into an industrial school for the poor children of the neighbourhood. He taught all his pupils reading, writing and arithmetic. The boys received instruction in farming, and the girls in gardening, house-keeping and sewing. In 1799 Pestalozzi and an associate opened at the Castle of Burgdorf a college for the training of teachers. A secondary school, an elementary school and an orphan asylum were included in their plans and connected with the college. This



ON THE NORTH-WEST FRONTIER
Street scene in Peshawar.
Courtesy: Indian Railways Bureau

school soon became the centre of educational experiments. After four years, the institution was removed to Yverdon on Lake Neuchâtel, where it continued until 1825. The first five years of this period were characterized by brilliant success, and the school became internationally famous, but dissensions among the faculty caused it to decline. In 1825 the school was closed and two years later, the founder died in poverty.

Pestalozzi was a pioneer teacher of the method of instruction that is based on psychology. He believed that the principles of education were to be found in human nature, and that the child's physical, intellectual and moral capacities should be developed. He advocated industrial training along with instruction in subjects commonly taught in the schools, and placed great stress upon sense training. The study of Nature, of objects, and lessons from the pupil's daily experience were to him as valuable as lessons found in books. Pestalozzi's educational works include *The Evening Hours of a Hermit*, *Leonard and Gertrude*, and *How Gertrude Teaches her Children* (originally written in German).

PÉTAINE, *peh ta'N'*, HENRI PHILIPPE (born 1856). French soldier, one of the great military leaders of the World War. He was a colonel on the retired list when war broke out, but he was immediately placed in charge of a brigade that, under his direction, won

distinction in the retreat from Charleroi to the Marne. Just before the Battle of the Marne in September, 1914, Pétaïne was promoted to be a general of division. He was soon made commander of an entire army corps, and after the Artois and Champagne campaigns he was made chief commander of the army defending Verdun, in the spring of 1916.

He was made Chief of Staff in April, 1917, and about two weeks later, succeeded to the supreme command on the western line of battle. When, in 1918, Marshal Foch assumed command of the entire allied armies, General Pétaïne loyally co-operated with him, and was responsible for several of the offensives that forced the Germans back. Shortly after the Armistice, in November, 1918, he received from the President of France the baton of Marshal.

Marshal Pétaïne became Inspector-General of the army in 1922, a post which he held



MARSHAL PÉTAINE
Photo: Topical

until 1931, when he was made Inspector-General of air defences on land.

PETARD, *pet ard'*. An iron case filled with gunpowder, furnished with a slow match or clockwork, which in earlier warfare was fixed to gates or palisades to blow a hole in them.

Petards were fixed to the gates of forts or towns by a party of soldiers, termed the "Forlorn Hope", a dangerous duty owing to the enemy's fire and the chance of a premature explosion. Hence, "hoist with his own petard," describes the fate of a man whose machinations turn against himself. (Derivation from French *péter*, to explode).

PETER I, ALEXEYEVITCH (1672-1725), known as **PETER THE GREAT**. The most notable of the Tsars of Russia; under him Russia became a great power. He was



PETER THE GREAT
Photo: Brown Bros.

the son of the Tsar Alexis Mikhailovitch by his second wife, and in his youth his half-brothers, Feodor and Ivan, stood between him and the throne. Feodor, who died in 1682, named Peter as his successor, but Sophia, sister of Ivan, desired to have her brother crowned, because he was weak-minded and would permit her to rule. At length both brothers were

crowned, but in 1689 Peter forced Sophia to resign the government and enter a convent, while he himself became in reality sole ruler, though associating Ivan's name with his own until Ivan's death, in 1696.

Peter saw what he wished to accomplish for Russia, and the vast obstacles in his way, but they never daunted him. If he was to meet the Western states of Europe on an equal footing, he must have an organized fighting force, and reorganization of the army on the German model was the first reform which he set in motion. Then, too, he desired for Russia a navy, and an outlet for that navy on ice-free waters. In pursuance of this design, he took Azov from the Turks in 1696, thus gaining a port on the Black Sea.

Peter brought artisans, engineers and soldiers from other countries, but they could not teach him all he wished to know, and in 1697 he set out on a tour of Europe, tarrying where he could learn anything. Gunnery, ship-building, anatomy—he acquired more than a superficial knowledge of these and of many other subjects; nor was he above working

in the shipyards in Holland and at Deptford, that his knowledge might be of the most practical kind. Before he had completed his travels, he was recalled to Russia by a rising of the imperial guard, which he put down with great severity.

He ordered his subjects to adopt European dress, instead of the flowing Oriental costumes, and he taxed beards and moustaches to discourage the custom of wearing them. But he did not confine himself to such externals; he encouraged foreign commerce, reorganized the Church, making himself its head, reformed the calendar; and released women from their almost Asiatic seclusion. Nor did he cease his struggle for open ports.

National Projects. To secure access to the Baltic Sea, Peter entered upon a contest with Sweden which lasted from 1700 to 1721. In his first battles with Charles XII, he was utterly defeated, but persisted until, in 1709, he gained complete victory at Poltava. Two years later, however, in a war with the Turks which Charles XII had instigated, he suffered reverses, and lost Azov. Meanwhile in 1703, Peter had begun the construction of his new capital, Petersburg (renamed Petrograd in 1914 and Leningrad in 1924) on territory which he had wrested from the Swedes, and in 1712 transferred to it the government from Moscow. Under the 1721 terms of peace with Sweden, Russia gained Livonia, Estonia, Ingria, Karelia and part of Finland. In the same year, Peter was proclaimed Emperor of all Russia. In implementing his reforms Peter was utterly ruthless, and both his wife and son suffered for resisting him. In 1712 he married his mistress, Catherine, who succeeded him upon his death in 1725, as Catherine I.

PETER II (1715-1730). The son of Tsarevich Alexis and grandson of Peter the Great. Peter was proclaimed Tsar at the age of 12. He was closely guarded by one unscrupulous minister after another, and would have been married to the daughter of the one in power if he had not died at the age of 15.

PETER III (1728-1762). Empress Elizabeth, daughter of Peter the Great, brought up her nephew Peter, son of her sister Anna, and in 1745 arranged his marriage with Princess Sophia Augusta Frederica of Anhalt-Zerbst. Peter was mentally unbalanced, but Catherine, as she was called in Russia, was a brilliant woman, and they pursued their own interests, each apart. Peter succeeded in 1762, when Prussia, attacked by Russia and Austria, was nearly in despair. His admiration for Frederick the Great saved Prussia, for he made peace and restored Russian annexations. He had threatened Austria and declared war on

Denmark when he was removed and probably murdered, Catherine ascending his throne.

PETER I. KARAGEORGEVITCH (1846-1921) A king of Serbia who lived to see his country freed from Turkish rule and eventually a part of the new kingdom of Yugoslavia. Peter was born in Belgrade, capital of Serbia. In 1858 his father, Prince Alexander, was forced to abdicate, and the boy was taken to Hungary to be educated. While serving as an officer in the French army during the Franco-German War, he was captured three times by the Germans, but each time escaped. Largely through Peter's influence, the Balkans were encouraged in the revolt which led in 1877 to the Russo-Turkish War and terminated in independence for Serbia. He became connected with the rulers of Russia and Italy through his marriage in 1883 to Princess Zorka, daughter of Prince Nicholas of Montenegro. They lived quietly together at Cetinje, and after Zorka's death, Peter moved to Geneva.

In 1903 the ruling king of Serbia, Alexander Obrenovitch, and Queen Draga were assassinated, and the house of Karageorgevitch again gave Serbia a king in the person of Peter, who assumed the title Peter I. During his long reign, popular sentiment for the union of the Slavs within a Greater Serbia steadily increased, and it was the agitation in behalf of this movement that led to the assassination of the heir to the throne of Austria in 1914. The victory of Serbia in the Balkan Wars had also inflamed patriotic feeling.

In June, 1914, King Peter's poor health forced him to name Crown Prince Alexander as regent. Within a few weeks, Austria-Hungary declared war on Serbia, and the great World War had begun. When, in 1915, Austrian, German and Bulgarian troops overwhelmed the kingdom, Peter and Alexander accompanied the Serbian troops in the retreat across Albania. The aged king lived in retirement until his death in 1921, but Serbian interests were ably managed by Alexander, who became king of Yugoslavia in 1920, and had done much to promote his country's unity when he was assassinated in 1934 at Marseilles.

PETER II, King of Yugoslavia (born 1921). The eldest of the three sons of King Alexander, he succeeded to the throne on his father's assassination, at which time he was in his first term at a preparatory school in England. He comes of age in 1941. During his minority Prince Paul, his uncle, is first Regent. See PAUL KARAGEORGEVITCH.

PETER, SAINT. The chief of the twelve Apostles chosen by Christ. His original name was Simon, the title Peter (= Rock), which he was afterwards to bear, being foretold to

him by Jesus, when Andrew his brother brought him to meet his future Master for the first time (John i. 42).

Simon Peter was a Galilean, the son of a man named Jonas, and his birthplace was Bethsaida. At the time of his appearance in the Gospel story he was a married man living in Capernaum and pursuing the trade of a



SAINT PETER
Medieval terra-cotta sculpture.
Photo: Victoria and Albert Museum

fisherman. He had become the disciple of John the Baptist, and when Jesus began his ministry in Galilee some months after their first acquaintance He called Andrew and Peter to follow Him, and said that He would make them "fishers of men." Later, when He separated the twelve from His other followers, the name of Peter is placed first.

All through the ministry of Jesus, Peter is described as taking the most prominent position, and more sayings of his are recorded

in the brief narratives of the Gospels than of any of the other Apostles. The most remarkable is his declaration, in answer to our Lord's question, "Whom say ye that I am?"—"Thou art the Christ the Son of the living God," the conviction at which he had arrived, through study of our Lord's actions and words, of the truth which it was the aim of his subsequent life to preach. This declaration justified Christ's original prophecy concerning his name, and earned from Him the reply "Thou art Peter, and on this rock I will build My Church."

The events which centred upon the betrayal and death of Jesus shed light upon Peter's character, and mark a weakness at that time which he was afterwards completely to overcome. His very affection for his Master, and the natural impulsiveness of his nature, shown again and again in his history, led to his temporary undoing. They moved him to draw his sword in the Garden of Gethsemane and wound the High Priest's servant. But he had not yet acquired the stability of courage to enable him to stand by his action. With the other Apostles he forsook Jesus and fled. It was the same with his behaviour in the High Priest's palace, when he denied Christ.

But his repentance was sincere and his future actions show that it was lasting, and the fact that the Risen Lord appeared to him, separately from the other disciples, very soon after the Resurrection, shows that he had not lost his Master's confidence (1 Cor. xv. 5).

In the history of the early Church, recorded in the Acts, Peter at once appears as its leader. It was at his suggestion that a new Apostle was chosen in the place of Judas, and he preached the sermon after the descent of the Holy Ghost at Pentecost. Together with John he visited Samaria to receive the first Samaritan converts. He was prominent in defending the Church against the persecution of the Christians by the Sanhedrin. It was to him that the vision of Joppa (Acts X) was given, which led to the admission of the first Gentiles into the Church without circumcision, in the person of Cornelius the centurion and others. And in the council at Jerusalem, which met to settle the vital question of the relation between Jews and Gentiles in the Church, Peter was the foremost speaker.

He ended his life at Rome, where, according to a very strong tradition, he was the first bishop, and where he was crucified—head downwards at his own request—in the reign of Nero.

PETER, EPISTLES OF. The *First Epistle* is believed to have been written in Rome in the year A.D. 65, after the burning of the city by

Nero. In this letter, Peter is writing to Jewish Christians especially. It is assumed that one Silas, or Silvanus, was Peter's amanuensis. The *Second Epistle* differs entirely in style, and modern critics consider that it was not written by the Apostle. See APOSTLES.

PETERBOROUGH. A city, Municipal Borough, and the capital of the Soke of Peterborough, with an area of 10,022 acres and a population of 43,558 in 1931, situated



PETERBOROUGH CATHEDRAL
The West Front is mid-thirteenth century
Photo Taylor

on the River Nene. Industrially, it is the principal town of the district, the clearing-house for a wide agricultural area and an important railway centre. Corn and stock markets, cattle and horse fairs are outstanding, whilst heavy industries include engineering and the manufacture of agricultural implements. The history of the city goes back to the year 655, when it is recorded that a Saxon monastery was founded; a second Saxon church was raised in 870 after the first one had been destroyed during the Danish incursions, and this latter church is associated in legend with Hereward the Wake. The present fabric, which is constructed entirely of Barnack stone, is one of the most magnificent cathedral churches in England, its west front being unsurpassed. It is principally of late Norman construction, dating back to the mid-twelfth century.

Other features of interest in the city include the market cross and the fifteenth-century Parish Church of St. John the Baptist. The town was a Saxon burgh, and owing to its wealth at that period earned the name of Gildenburgh (Goldenborough); the markets established by Charter as early as the tenth century assured its medieval prosperity. It was created a city by Henry VIII in 1541. In more recent times it was incorporated as a municipal borough in 1874, and in 1928 a number of the neighbouring parishes were included within it.

PETERBOROUGH, EARLDOM OF This was created by Charles I (1627) and became extinct in 1814, the holders throughout being Mordaunts. John Mordaunt, first Earl of the line, adhered to the Parliament in the Civil War and was General of the Ordnance under the Earl of Essex. His successor Henry Mordaunt first served with the Parliamentary Army and later returned to allegiance to Charles I, fought at Newbury, and then escaped to the Continent. On the Restoration he was appointed Governor of Tangier, and bore St. Edward's Sceptre at the coronation of King James II. His nephew Charles, son of John the first Earl, succeeded as third Earl. Some historians ascribe to him the initiation of the movement to induce William, Prince of Orange, "to undertake the business of England." He came to England with the Prince of Orange, occupied Exeter, and raised Dorset and Wiltshire to support the Prince. On William's accession he was created Earl of Monmouth and made First Lord of the Treasury. On the accession of Queen Anne he was appointed to the joint command of the Fleet with Sir Cloudesley Shovell and also to the command of the expeditionary army to the Peninsula, his captures of Montjuich, Barcelona, and València coming just before Marlborough's great victory of Ramillies. Later he lost favour and left England, but on the death of Queen Anne was recalled by King George I. He was a patron of literature, the friend of Swift, Pope, Arbuthnot, and Gay. Charles Mordaunt, fourth Earl of Peterborough and Earl of Monmouth, died in 1779 and was succeeded by his only living son, Charles Henry Mordaunt, who died unmarried in 1814. The earldom then became extinct, and the Barony of Mordaunt of Turvey devolved upon his half-sister Lady Mary, at whose death it passed to the fourth Duke of Gordon.

PETERHEAD. A burgh of Aberdeenshire (which see).

PETER LOMBARD, BISHOP OF PARIS (c. 1100-c. 1160). The son of poor parents, he taught theology at the cathedral school at Paris, where he became Bishop in 1159. He was the author of a book, the *Sententiarum Libri Quatuor*, which profoundly affected theological training throughout Europe. He was perhaps editor rather than author, for his book was an arrangement of the *sententiae* or opinions of earlier theologians. He was known as *Magister sententiarum*.

PETER'S PENCE. The name applied in the Roman Catholic Church to voluntary offerings for the support of the Pope. The custom is said to have originated in England



PETER THE HERMIT

He is here shown preaching the crusades

in Saxon lands, and to have spread from there to the Continent, although it was not definitely established until the middle of the eighth century. It was forbidden by Henry VIII, but has been revived.

PETER THE GREAT. See PETER I OF RUSSIA.

PETER THE HERMIT (about 1050-1115). A monk of Amiens, the preacher of the First Crusade. Little is known of his life until 1095, when he began to urge the necessity of a crusade to wrest the Holy Land from the infidel. In 1096 he set out with about 30,000 undisciplined followers, mostly from the poorer classes. They straggled on through Europe, but after crossing the Bosphorus into Asia Minor, proved so unruly that Peter left them and joined the army of Godfrey de Bouillon. He had a part in the capture of Jerusalem, and in July, 1099, preached on the Mount of Olives. See CRUSADES.

PETIOLE, *pet' e ôle.* See LEAF.

PETITION (Latin *petere* to seek). A prayer or request. Petitions to the King or his Council or ministers or to Parliament have

at many times played a part in constitutional history. Indeed the earliest form of what we call legislation by Act of Parliament seems to have been merely a petition from the Commons requesting the King to make a legislative enactment, and the great jurisdiction of the Court of Chancery appears to have begun in the practice of handing over to the Chancellor petitions which had been sent to the King or Council.

A petition to the King may be a request that he will exercise one of his prerogative powers (for example, that of pardon), or that he will inquire into some alleged injustice or oppression by public officials for which there is no legal redress. The right of the subject to petition the King was expressly recognized in the Bill of Rights (1689). Petitions to the King must be transmitted through the Home Secretary; petitions to the House of Lords can be presented only by a peer, petitions to the House of Commons by a member or by the representatives of certain corporations. It is an offence to approach the King or either House of Parliament with more than ten persons on pretext of presenting a petition.

The term is also used to describe various forms of application to the courts (election petitions, petitions in bankruptcy, lunacy, matrimonial causes, etc.) Technically the term "petitioner" covers any person making application to a court otherwise than as against any defendant.

Petition of Right. It is a rule of law that no action can be brought against the King or the Crown (that is, the King in his official capacity) in any Court. If a subject thinks himself to have been injured by the acts of the King or his ministers or servants in a way for which he could have brought an action if the acts had been those of a private individual or his servants, his only redress against the Crown is by way of petition. Such a petition is called a Petition of Right. It must first be submitted to the Attorney-General for his *fiat*; if this is granted, the case is tried in a court in the ordinary way, but if judgment is given in favour of the petitioner it cannot be enforced against the Crown; the Crown, however, satisfies such judgments as a matter of grace. This procedure, one may note, is subject to some limitations. See **BRITISH CONSTITUTION** (The Rule of Law).

PETITION OF RIGHT. A restatement of constitutional principles, presented to Charles I in 1628 for his assent in the form of an Act of Parliament. Charles I, a fervent believer in the Divine right of kings, was attempting to use Parliament as an instrument to accomplish his autocratic purposes. In this he was aided by his favourite, the Duke of

Buckingham, who was strenuously opposed by the Parliamentary leaders Eliot, Pym and Wentworth. Charles needed money for personal and political purposes, in particular the expenses of Buckingham's abortive attempt to relieve La Rochelle, where the Huguenots were besieged by Richelieu, and his only means of raising the necessary funds was to persuade the Commons to vote appropriations. Accordingly, Parliament met in adjourned session early in 1628. The king was met by refusal to vote supplies until he should promise redress of grievances. To make its position clear, the Parliament drew up the Petition of Right. Among the wrongs complained of were the levying of taxes without the consent of Parliament, the billeting of soldiers in private houses, the establishing of martial law in time of peace and the imprisonment of citizens without cause shown. The necessities of the king were so pressing that he ultimately accepted and signed the Petition. Thereupon Parliament voted five subsidies for the king's use but pursued their attack on his abuse of his prerogative by drawing up three Remonstrances, one against Buckingham and the others against certain methods of taxation. Difficulties of interpretation of the Petition of Right immediately arose, especially concerning the question as to whether the king could levy tonnage and poundage without a formal grant.

The Petition of Right had important results, though its immediate objective was not attained. It solidified popular sentiment, gave the opposition a rallying-point, and thus hastened the triumph of constitutional rule, which was established in 1688, when William III signed the Bill of Rights.

PETRA, *pe'tra*. An ancient city of Northern Arabia, enclosed on all sides by walls of rock. Since its rediscovery in 1807, it has been often investigated. The walls of the gorge of red sandstone rise to 200 ft. in places, and along their sides are to be seen rows of cave tombs hewn out of solid stone and having ornamented façades.

Petra owes its Greek name to its peculiar character as a rock city; the word is possibly a translation of the Greek for "rock." Between the second and third centuries, this city was in the hands of a mysterious Arabian race, the Nabataeans, who held in their power the important caravan trade route between the Dead Sea and the Red Sea. Petra stood in a narrow gorge overhung by mountains along this route, and the Nabataeans made it their capital. Inscriptions left by its rulers are still to be found. In A.D. 106, Trajan made Petra the capital of a Roman province. For many years trade continued to the benefit of Rome, but when

the Nabataeans secretly diverted desert traffic to Palmyra, in Syria, the importance of Petra began to wane. It was conquered by the Moslems in the seventh century, and gradually fell into decline.

The most beautiful of the ruins of temple tombs is the Temple of Isis (The Treasury). An amphitheatre capable of seating some 5000 is in a comparatively good state of preservation. (See ARCHAEOLOGY).

PETRARCH, *pet' rark* FRANCESCO (1304-1374) An Italian poet and classical scholar, born at Arezzo of a family named Petracco.



PETRARCH
Usual Education Service

From this name the poet himself adapted the form by which he is commonly known. Francesco's father was a political exile from Florence, and consequently the boy spent much of his childhood wandering from city to city. He was sent to Montpellier, France, in 1319, to study law, and four

years later to Bologna. His father opposed his wish to devote himself to writing, but after his father's death in 1326 Petrarch gave most of his time to literary pursuits.

While at Avignon, France, in 1327, he saw the woman Laura, in whose honour he wrote nearly every poem for which he is now remembered. Her identity is unknown: some identify her as the wife of Hugh de Sade. The poet seems never to have known her intimately, and his verses deal more with the ideal qualities of woman in general than with one in particular; in this he resembles Dante.

His Latin poems and prose had made Petrarch so famous by 1340 that both the University of Paris and the University of Rome offered him the laurel crown for poetry, and, choosing the honour from the latter institution, he was publicly crowned on Easter Sunday, 1341. He afterwards wandered over Italy, and in his investigations, discovered several letters and two orations of Cicero. From time to time he went back to Avignon to be near Laura. After 1360 Petrarch spent his remaining years at Argua, near Padua.

He was the author of much Latin poetry, but his Latin works have not won the high reputation of his Italian verses. From 1370, when his *Canzoniere*, or collection of songs, was published at Venice, his influence over the poets of Europe was very considerable. He gave the sonnet a dignified position

in poetry, with new vigour, warmth and nobility. He was a close friend and admirer of Boccaccio.

PETREL. A family of birds found in the northern and southern hemispheres, but especially in southern regions. The common name of the birds—petrel—meaning "little Peter," is derived from their habit of moving quickly and gracefully over the tops of the waves, as if they were walking on the water. One of their peculiarities of structure is the possession of tubular nostrils. The petrels vary greatly in size from the little *Stormy*



FULMAR PETREL
Photo: John Kearton

petrel which is no bigger than a sparrow, to the *Giant petrel*, which is almost as large as an albatross. The nests are usually made in holes or crevices of rocks, but sometimes in a hole in the ground near shore. A single white egg is laid.

Wilson's petrel is typical of the family; it is 7 in. in length. Its plumage is a mixture of sooty black, grey and white; the feet and bill are black, and there are webs of yellow between the toes. The long wing span of this petrel, which is 18 in. in extent, and its long legs, make it seem larger than it is. *Leach's petrel* is similar in size and colouring. The *Stormy petrel*, best-known of the Old World species, is a tiny bird, not much more than 5 in. long, with a sooty black coat relieved only by touches of white near the tail and on the wings. It is found on the European side of the Atlantic Ocean and is also known as "Mother Carey's chicken." It is the smallest of web-footed birds.

Scientific Names. Petrels belong to the family *Procellariidae*, in which are included the fulmars and shearwaters. *Wilson's petrel* is *Oceanites oceanicus*; *Leach's* is *Oceanodroma leucorhoa*.

PETRIE, WILLIAM MATTHEW FLINDERS, SIR (born 1853). A well-known English, Egyptologist, founder of the Egyptian Research Account in 1894, enlarged as the



SIR FLINDERS PETRIE

The noted archaeologist is shown examining pottery found by him at Gaza and belonging to the period of the Shepherd Kings of Egypt, 1700 B.C.

Photo: Fox

British School of Archaeology in Egypt in 1905. In 1880 he began his series of surveys and excavations in Egypt. From 1884 to 1886, his excavations in the Nile delta brought to light the lost Greek city of



PETRIFIED TREE IN ROCKY MOUNTAINS

Photo: Cherry Kearton

Naucratis and the site of the Greek settlement at Daphnae. In the Fayum he recovered papyrus rolls of great interest and value. In 1890 he discovered and investigated Tell-el-

Hesi (then thought to be the ancient Lachish of the Bible) for the Palestine Exploration Fund. Subsequent discoveries included the tombs of the kings of the first dynasty at Abydos, the labyrinth at Hawara, prehistoric remains at Negadi and other important sites.

PETRIFICATION. Fossils are petrified when their minute structure is preserved by impregnation with mineral substances



PETRIFICATION

Bird's nest covered with thin deposit of calcium carbonate

Photo: H. I. Taylor

such as silica, calcium carbonate, iron carbonate, etc. Fossil plants may be preserved as coal or lignite, but their remains may be petrified, as in the cases of silicified wood or calcified plant remains in coal-balls. In such cases, sections of fossil plants seen under the microscope show the minute cellular structure wonderfully preserved.

Mineral springs, commonly called petrifying springs, merely cover objects immersed in them with a thin incrustation of calcium carbonate.

PETROGRAD. Former capital of Russia, formerly St. Petersburg, and in 1924 renamed Leningrad (which see).

PETROGRAPHY. See PETROLOGY.

PETROL. Motor fuel: the product obtained in distillation of crude petroleum (in recent years by the "cracking" process—see under PETROLEUM) between about 70° and 100° C. It is a complex of a number of paraffins, has a specific gravity of 0.73, is very volatile, and with air forms an explosive mixture; hence its use in internal combustion engines. Aeroplane spirit consists of fractions having a still lower boiling-point. Great advances have been made in recent years in the manufacture of a fuel reducing

decomposition products and combining freedom from "knock" with maximum power.

PETROL ENGINES. The high pitch of perfection to which the present type of petrol engine has been raised may be attributed mainly to the experiments of Gottlieb Daimler. Previous to his production in 1886 of a motor-cycle and in 1887 of a car fitted with internal combustion petrol engines, the latter were very crude and inefficient. Daimler, by reducing the weight of his engine drastically and increasing the engine speed to 800 revolutions per minute, managed to extract a performance which although poor when compared with modern engines was considerably in advance of his contemporaries. The design of Daimler's engine was practically identical with those of to-day.

The principle of the petrol engine may be summed up briefly as the expansion of gases after heating. To simplify matters, the functioning of a single cylinder four-stroke engine will be described. The cylinder barrel, which is gas-tight at one end, contains the piston, which is allowed to slide up and down inside the cylinder bore. The piston is connected to a flywheel by a crank, the connecting rod, so that the vertical movement may be converted into a rotary one. In order to overcome the enormous friction which would be present if the piston was a tight fit in the cylinder bore, a working clearance is allowed and the gas is prevented from escaping by steel rings which are fitted in grooves cut in the piston. The cycle of operations followed in the four-stroke engine may be described as—

1. Induction Stroke. The piston descends and the inlet valve opens, allowing a mixture of air and petrol in the form of a fine spray to be drawn from the carburettor. The suction created by the descending piston assists the ingress of the combustible mixture, which is supplied by the carburettor, the full working of which is described later. As the piston reaches the bottom of its stroke, the inlet valve closes and the cylinder becomes a sealed chamber containing the mixture of air and petrol.

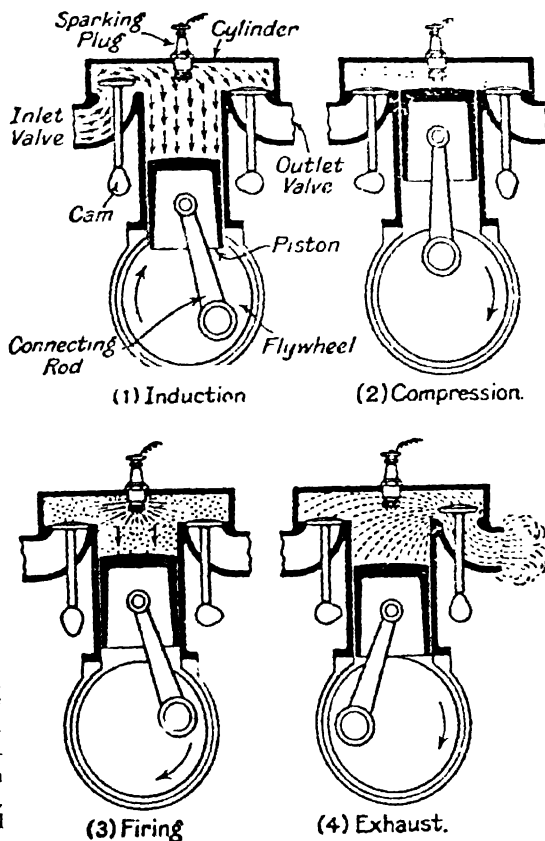
2. Compression Stroke. The piston ascends and compresses the mixture into a considerably smaller space.

3. Combustion. This stroke, frequently known as the firing stroke, is the only one of the four from which the power is derived. At a set point in the piston travel, an electric

spark appears at the sparking-plug points, and the resultant explosion drives the piston down with great force.

4. Exhaust Stroke. The series of operations is completed by the opening of the exhaust valve, and the burnt gases are expelled from the cylinder by the ascending piston.

It will quickly be realized that other mechanism must be introduced if the engine



PRINCIPLE OF THE FOUR-STROKE ENGINE

is to function with any degree of efficiency, and this consists of—

(a) **The valves**, which govern the ingress and exit of the gas. By arranging suitable gearing, the valves may be set to open and close at certain points of the crankshaft rotation. These points, which are known as the valve timing, vary considerably with the different engine designs, and the valve gear itself may take various forms. The most common is the *poppet valve*, which may be located at the side of the cylinder or in the cylinder head, and which may be operated in widely different manners. Another type

less frequently used is the *sleeve valve*, in which the valve timing is obtained by steel sleeves uncovering and closing ports in the cylinder walls.

(b) **Carburettor.** The carburettor is a device used in internal combustion engines, operating with liquid fuels such as petrol and benzol, which are vaporized at normal temperatures with comparative ease. The purpose of the carburettor is to convert the liquid fuel into a mist or vapour and mix it with air in the correct proportion for the ensuing combustion. This must be done efficiently under all conditions of engine speed and power. The carburettor is placed as near to the engine as possible, and supplies the required mixture of air and petrol vapour to a pipe termed the *induction pipe*, which is connected to the individual cylinders of the engine by short connecting or branch pipes.

Process of Carburation. Practically all modern carburettors are of the spray type, and, whilst the process of carburation is fundamentally simple in itself, the requirements mentioned above demand a device which is delicate and rather complicated in its action. The diagram opposite shows the principal parts of a particular type of spray carburettor. Petrol or other fuel is carried in a tank and supplied to the float tank of the carburettor by the petrol inlet pipe. The level of the petrol in the float tank is kept constant by means of the float which controls the needle valve. As the float rises, the needle valve is forced downward and regulates or stops the further supply of petrol. The petrol is normally delivered to the engine through the main jet, whose outlet is placed at a slightly higher level than the petrol in the float tank. This prevents loss of petrol while the engine is not running. The air inlet pipe to the engine is reduced in size to form what is termed a *choke*, and the smallest diameter of the choke is arranged at the same level as the main jet. The supply of air and petrol vapour is controlled during the running of the engine by a movable disc termed the *throttle*, which may be rotated by a spindle passing through the centre of the inlet pipe. The full lines show the throttle when nearly closed and the broken lines show it when full open. When the engine is running at full speed and with the throttle open, the velocity of the air at the throat of the choke is greater than at the tube inlet, and in consequence the pressure of the air at the narrowest section of the choke is less than that of the atmosphere. This causes the petrol to issue from the main jet in the form of a fine mist, and so it becomes intimately mixed with the combustion air entering the engine.

Actually, whilst the arrangement just described functions in the correct manner at a certain power and speed, it will not ensure the desired uniform mixture of air and petrol vapour at all powers and speeds, and various devices known as *compensators* are used to remedy this deficiency.

The carburettor will operate only when a current of air is flowing through the inlet pipe, and so the engine must be started by rotating the crankshaft by hand, or by means of a small auxiliary electric motor termed a *starter*. The engine is then, however, running at a low speed, and the small velocity of the air in the choke is insufficient to induce the petrol to issue from the main jet. If the throttle is very nearly closed, however, the rush of air through the small space remaining between the throttle and the inlet pipe causes a reduction of pressure in the tube placed directly above the auxiliary jet. Air is thus drawn in through this tube and it is richly charged with petrol which issues from the auxiliary jet. On opening the throttle, the auxiliary jet goes out of action and the main jet comes into operation.

(c) **The Ignition.** The electric spark which fires the charge is timed to occur at the correct moment by means of suitably arranged gearing in a similar manner to that of the valves. The ignition system usually consists of an accumulator and induction coil or a high tension magneto, the actual spark in each case jumping across the points or electrodes of a sparking plug. As the spark obtained from a coil is independent of the engine rotation, the present-day tendency is to rely on this form of ignition in preference to the high tension magneto. The primary object of this is to ensure easy starting. A coil ignition system consists briefly of an accumulator which supplies current to an induction coil. This coil is formed of a series of windings round a soft iron core. The primary or low tension consists of a small number of turns of thick wire, and the secondary or high tension of a large number of turns of fine wire. A magnetic flux is created in the iron core by the current flowing from the battery through the primary windings. The low tension circuit is separate from the high tension, except for a common earthing point. The secondary winding is acted upon by a magnetic flux passing through the soft iron core, and when this flux is destroyed or moved across the coil by the interruption of the low tension current a voltage is induced in the coil. The current flows from the low tension coil to a mechanical interrupter, the contact breaker, and the distributor, which are driven by gearing, so ensuring that the spark takes place at

the correct intervals and in the required cylinder.

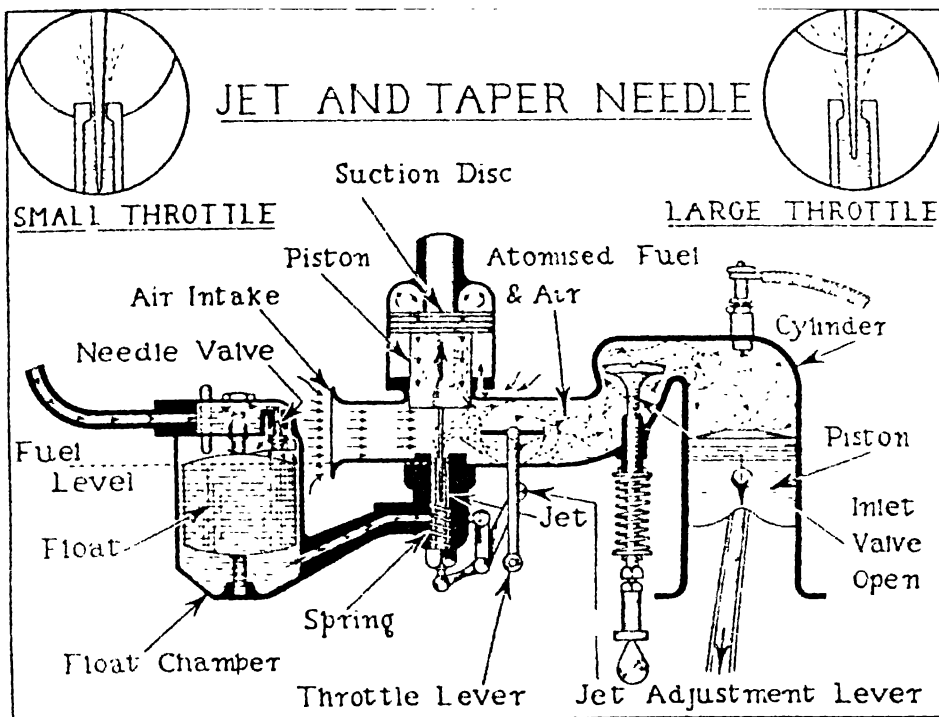
The above is a very simple exposition of the method of working and the additional mechanism involved in the functioning of the present type of four-cycle engine.

The other form of petrol engine, known as the two-stroke, and which gives a power stroke every other crankshaft revolution has not found favour and its use is largely confined to small motor-cycle engines.

pump. Steam cooling is a method also used, steam passing over the cylinders and being condensed in the radiator.

Although obsolete, mention must be made of the *rotary engine*, because it was with this type that many of the early successful flights in Europe were made. The great difficulty of reducing the air resistance has largely been responsible for the practical disappearance of this once famous type.

Compression ignition engines are being



PRINCIPLE OF THE SPRAY OR NEEDLE JET CARBURETTOR

Aero Engines. In general the aero engine may be divided into two broad types, the air-cooled and water-cooled or liquid-cooled. Both are widely used in aviation, and both are developments of the internal combustion engine as used in motor-cars, and work on the same general principles. The engines may be two or four stroke and spark-ignition or compression-ignition—the so-called Diesel type, developed first by Akroyd-Stuart.

Air cooling is carried out by allowing the air to flow directly over the cylinders, which are ribbed in special shapes, often to increase the available cooling surface and lessen the resistance to the air flow. In liquid cooling, the cylinders are surrounded by a jacket through which the liquid, generally water, is passed from the radiator by means of a

developed, as they have the advantages of a low fuel consumption and can use heavy oil, which is far less inflammable than petrol. At the present time the chief disadvantage of the C.I. engine is its greater weight per horse-power compared with the petrol engine. It can be built in any of the arrangements suitable for the petrol engine, and be either air-or-liquid cooled or two-stroke or four-stroke.

The range of horse-powers available in present-day aero engines is from about 80 to 1200. Both smaller and larger powers have been made, but they are not in general use. Most of the smaller-powered engines have a direct drive on to the airscrew, but with engines of large powers a reduction gear is fitted.

As the horse-power of an engine falls off with height, aircraft called upon to operate at high altitudes, as military aircraft, are fitted with *supercharged* engines. A blower or supercharger supplies air under compression to the engine and enables a more or less constant power of the engine to be maintained at height. For great heights two superchargers may be fitted, each one coming into operation at a pre-determined height.

All the steels used throughout the construction of aero engines are of special quality, and of considerably greater strengths than the steels normally used in other forms of engineering construction. For pistons and cylinder heads, aluminium alloys are often used, and magnesium alloys for casing, crankshaft sumps and other parts where there is little or no load on the material.

The research on light alloys has brought down the weight of the modern aero engine very considerably. There is no doubt that, in the near future, engines will be in use which weigh only 1 lb. per horse-power, and that, with the further development of steels and light alloys, even lighter engines still will be evolved which will have a decisive effect on the future of air transport.

It has already been pointed out that most aero engines are either air- or liquid-cooled. A development is high-temperature cooling, and the liquid most widely used for the purpose has been ethylene glycol, which enables smaller radiators to be used than with water cooling. In cold climates an anti-freeze mixture must be used, as glycerine and water or ethylene glycol and water.

One major difference between the motor-car engine and the aero engine is that the latter is fitted with dual ignition. Each cylinder head is provided with two sparking plugs, giving a definitely better and more certain firing. Two magnetos are fitted. Where an aircraft carries wireless, the whole of the ignition system is bonded and screened, so that the wireless system is unaffected. The bonding and screening is carried out by enclosing the ignition system in metallic conductors, which are then all linked together.

Aircraft engines call for the use of a higher standard of fuel than those required for motor transport. They are produced by a more careful refining and "cracking" process, and such fuels must also have a high anti-knock value. They must be capable of easy starting, have a low freezing point, and be free from impurities. Fuel is supplied to the engine by gravity feed or through a pump and pressure system.

PETROLEUM. The word is derived from Latin *petra oleum*, meaning "rock oil," and the equivalents of the word are found to-day

in all languages. Though the great industry occupied in searching for, producing, transporting and refining petroleum dates back commercially for not more than 80 years, it is a matter of interest to record the fact that petroleum and its use can be traced back to pre-Christian times, while frequent references are made to it in the Bible. Many ancient authors make extensive reference to petroleum, prominent among them being Herodotus, who described the methods adopted in his day at the pits of Kirab for raising the oil, which liquid, he added, "gives off a very



EARLY OIL WELL

Drilled near Titusville, Pennsylvania, in 1859, it is considered if not actually the first oil well, at least the first successful one in America

Photo: Brown Bros.

strong odour." In those far-off days petroleum was regarded as a sacred fire, and even to-day in Southern Russia are to be seen the remains of the temples in which the oil was burned on the altars. Petroleum has almost an unbroken historical connection with the Jews and Persia (Iran). In remote times considerable quantities of oil were found in hand-dug wells in Persia and sold to foreign countries, the duties upon this exported oil bringing considerable sums of money into the Shah's treasury. It was left to British enterprise in the early twentieth century to develop these wells on a commercial scale. To-day Iran is one of the largest oil-producing countries in the world; in the Anglo-Iranian Oil Company, which controls immense concessions there, the British Government is largely interested as a shareholder. In Near Eastern countries adjacent to Iran, modern methods of oil search and exploitation have led to the discovery of

large stores of petroleum, the commercial outcome of which has been the formation of the Iraq Petroleum Company—an international enterprise—and the construction of the longest oil pipe-line in the world—1150 miles—from the desert oil fields to the Mediterranean Sea at a cost of about ten million pounds. The line, which traverses five different countries, was officially opened during January, 1935.

Before referring briefly to the numerous other large oil-producing countries in the world to-day, it is well to consider the complex problem of the origin of petroleum, which has been the subject of considerable scientific controversy for many years. Not a few of the leading scientists hold to the theory that petroleum is derived from metallic carbides lying far beneath the porous strata in which the oil is stored by Nature, and that even now the process of generation is proceeding. This idea, which may be termed the inorganic theory of petroleum origin, was considered to have received substantial support when it was found that the action of water on the carbides of certain metals resulted in the liberation of hydrocarbons. But the view that petroleum is of organic origin is to-day almost universally accepted, although there is no general agreement either as to whether it has been derived from vegetable or from animal matter, or as to the forms of life which provided for its genesis. In certain parts in the world—notably on the eastern side of the Caspian Sea and also near the Mediterranean—there is some conversion of organic matter into petroleum actually to be seen to-day. There is no doubt that each of the various views expressed as to the origin of petroleum contains elements of truth, and it is reasonable to suppose that a substance so varied in its physical and chemical properties has not in all cases been created under the same conditions or from an identical source.

Distribution of Petroleum Deposits. The geographical distribution of petroleum throughout the two hemispheres is no less wide than the geological formations in which it is held, though to-day over one half the oil produced comes from the Tertiary strata. Every country contains more or less petroleum, though up to the present it has not been found in commercial quantities in several parts of the world. Of the total crude oil produced in 1934—the figure was approximately 220,000,000 tons—the United States produced no less than 120,000,000 tons. Russia takes the second place with a yearly output of 24,000,000 tons, while in order of importance follow Venezuela, Rumania, Iran, the Dutch East Indies, Mexico, Colombia, Peru, Argentina and Trinidad.

Since the drilling of America's first commercial oil well by Colonel Drake in 1859, the oil industry of the United States has made amazing progress. At one time it supplied the world with 70 per cent of its mineral oil requirements, but during later



FIRE AT OIL WELL IN TEXAS

Photo: U. & U.

years the percentage has been decreasing owing to the progress of other oilfields, such as those in Iran, Rumania, and Russia. The British Empire, so far as is at present known, cannot boast of very large accumulations of liquid oil. Burma has been producing oil for many years, the leading company being the Burma Oil Company. Trinidad too, has a

thriving oil industry. There have been several attempts to discover liquid oil in the British Isles, but up to the present most of these have produced negative results. For many years there was an established shale-oil industry in the Midlothians, where quantities of shale were distilled for their oil content, but after a time, the influx of American oil at cheaper prices struck a blow to the Scottish shale industry from which it has scarcely recovered. It was during the European war that serious attempts to find commercial oil in England were made. The first well near Chesterfield did actually strike commercial oil, and this well is still producing small quantities, but in the other wells little or no success was met with. During 1935 Parliament passed an Act which has given a new impetus to the search for petroleum in England.

Methods of Oil Drilling. During the past fifty years the methods adopted to reach the oil deposits by drilling have undergone a distinct change. The methods of the ancients were naturally very crude, and generally consisted in digging a hole—such in the nature of a coal-pit shaft—and at shallow depths collecting the oil in leathern bottles. Then came the cable-tool or percussion system—very primitive and cumbersome, yet a great advance upon the old methods. In this case the shaft was made by dropping a steel bar, to which was attached a drilling bit, on the ground to be drilled. It was slow and tedious work—some wells taking years to drill to a depth of a thousand feet, but many thousands of wells were drilled in this way in almost every part of the world, while even to-day the system is still in use in many fields. The advent of the rotary system of drilling, some twenty years ago, greatly facilitated the search for oil, and moreover opened up a new vista for the whole oil industry, for by the use of the hydraulic rotary machine it is possible to drill to many thousands of feet in a few weeks. Wells reaching the enormous depth of over 12,000 ft., have been recently completed by this method. The principle upon which drilling proceeds is particularly interesting and simple. The drill stem is rapidly rotated and grinds away the strata, while the washings or debris from the hole are forced to the surface by a hydraulic stream which is forced down the hole. The shaft is cased as it goes down, and in many fields, upon the drill's reaching the productive levels, this casing is perforated to allow the ingress of the oil, which either flows to the surface under its own pressure or is pumped. Wells of the "gusher" type are not so numerous to-day as they were formerly, but in certain fields they are not uncommon

sights. The Russian fields provide large numbers of oil "fountains," as they are termed, but without doubt Mexico has in the past furnished the most powerful oil gushers, and some years ago one of its wells flowed for a long period giving not less than 18,000 tons daily. Another famous Mexican well might have produced even larger quantities, but it caught fire, and for weeks could not be controlled. Its flames were clearly visible 50 miles out at sea and at times reached a height of nearly 1000 ft.

Since the Russian Revolution, when the country's oil industry became nationalized under the U.S.S.R., very great progress has been made in the production of crude oil. The adoption of up-to-date American practice, and the use of American equipment helped in the industry. To-day, however, Russia manufactures the majority of her own oil plant, and Russia is to-day the most progressive country in the world in regard to the systematized search for new oil-bearing lands; in this direction recent efforts have even extended into the Arctic Circle. Many very important discoveries have been made, and new areas for oil production are being opened up by the drill in numerous parts of the U.S.S.R.

Oil Refining. The refining of crude oil, as it is produced from the earth, consists in the classification of the various hydrocarbons, by means of fractional distillation, into the many products which enter into our industrial and domestic life to-day. The refined products, in the order in which they are received by distillation, are: petroleum ether, motor spirit, illuminating oils, solar oils, lubricating oils, fuel oils and residuum—the first-mentioned being the lightest fraction, and fuel oils and residuum the heaviest, in specific gravity. The first attempts to refine petroleum were naturally very primitive, and probably one of the first oil refineries in the world was built near the Tigris in Iraq. Crude oil, it should be explained, varies greatly in its general character, for while certain crudes are pale in colour and almost transparent, others are almost black and viscid. Some, indeed, would appear to have undergone a course of refining by nature herself, for in some fields the crude oil will burn freely in lamps without any refining treatment. The chemical composition of petroleum consists essentially of carbon and hydrogen, together with oxygen and varying amounts of nitrogen and sulphur. The various series of hydrocarbons found in crude oil—paraffins and naphthenes—readily lend themselves to conversion into other compounds of carbon and hydrogen by dissociation, and this conversion produces compounds of higher



PETROLEUM

1. Newly-drilled gusher spouting. 2. Moreni oilfield in Rumania. 3. Rumanian oil well. 4. Drilling for oil, the head of the drill. 5. The pipeline from the Iraq oilfields to the Mediterranean, a distance of 1150 miles.

Photos. Brown Bros.; Keystone

volatility, such as motor spirit, etc. When the compounds of hydrogen and carbon are submitted to distillation, certain chemical changes occur, as the result of which other series of hydrocarbons are formed: for instance, it is possible to obtain aromatic hydrocarbons, including trinitrotoluene (generally known as the explosive T.N.T.), in addition to various dye products.

During recent years the "cracking" process of oil refining has been very widely adopted; briefly, it consists in distilling the oil at a temperature higher than the normal boiling-points of the constituents it is desired to decompose, and in practice, the result is that the heavier oils are turned into lighter hydrocarbons of lower boiling-points: thus the yield of the more valuable of the refined products is materially increased. As may be imagined, the refining of petroleum has undergone many changes from time to time. Before the advent of the internal combustion engine there was no demand for the lighter products of distillation; hence motor spirit was quite unmarketable, and enormous quantities were burned near the refineries; kerosene, or illuminating oils, were then the chief marketable products. To-day, however, the position is changed and motor spirit has become the main product required by the world markets, though the rapid increase in the use of Diesel engines, burning heavy oil, for omnibuses, lorries, airships, motor vessels, etc., may yet alter the ratio of demand.

Production of Petrol from Coal. The production of oil by the carbonization of coal has, during recent years, come much to the fore, and inventors have been particularly active in the United Kingdom, where there has long been a desire to utilize a portion of our low-grade coal reserves for the production of oil. The question of rendering Britain less dependent upon imported oil, as well as helping toward the prosperity of the coal-mining industry, is always looming largely, and there is no doubt that in the days to come, very appreciable quantities of oils will be drawn from coal. An arm of the British Air Force uses motor spirit so produced, and it is supplied in some public petrol stations. An I.C.I. plant for obtaining petrol from bituminous coal by hydrogenation of the crude oil was established near Stockton-on-Tees in 1935, and others have followed in various parts of the country.

PETROLEUM JELLY. See VASELINE.

PETROLOGY. Branch of geology which gives an account of the composition and structure of the rocks of the earth's crust, and classifies them according to their modes of formation and their mineral content. The petrologist endeavours to explain how

the rocks have been formed and whence their materials have been derived: whether direct from the internal magma—or from the destruction of older rocks.

A rock consists of (1) minerals, such as quartz felspar, mica, calcium carbonate, etc.; (2) remains of animals, such as foraminifera, corals, shells, sponges, etc.; (3) remains of plants, as in coal, lignite, etc.

Methods of Investigation. A great deal can be learnt about the nature of rocks by very simple means.

Their larger features may be examined by the naked eye, or with the aid of a good lens. Simple tests may be made to determine their weight, colour and coherence. Electromagnets may be used to determine the presence of iron, and acid may be used to test for carbonates.

Such simple tests as these are used by the field geologist, but they are insufficient to enable a full or accurate description of fine-grained rocks to be made.

The blowpipe, goniometer and specific gravity balance give still further information as to fusibility, angles of crystals, or possible composition of the minerals of which the rock is composed. See MINERALOGY.

In 1858 Sorby pointed out the great value of the examination of rocks by thin sections under the microscope. A slice of rock may be ground down with emery powder to $\frac{1}{16}$ to $\frac{1}{32}$ of an inch in thickness, when it becomes transparent enough to use very high powers of magnification which show the minutest details of structure.

Powdered rocks may have their constituent minerals separated by mechanical means. The electromagnet separates iron oxides—magnetite, haematite and ilmenite—and silicates containing iron, and leaves behind quartz, feldspar, etc. The method of panning used by gold-miners has been successfully used by petrologists for separating the heavier from the lighter particles, but the heavier liquid method now adopted gives much better results. Methylene iodide, bromoform and Clerice's solution may be used to separate biotite, muscovite, quartz, orthoclase and oligoclase.

Chemical means are used for distinguishing minerals or rocks, and detailed analyses are made which give the percentage composition of the rocks as oxides, such as alumina, silica, ferrous and ferric oxide, magnesia, lime, potash, soda, titanium oxide, phosphoric oxide, etc.

CLASSIFICATION OF ROCKS. Rocks may be simply and broadly classified into igneous, derived and metamorphic.

Igneous Rocks are formed from molten material from within the earth's crust. They may be either extrusive or intrusive

Extrusive rocks are those which have been formed from material ejected from cracks or holes in the crust. The chief types are lavas, including obsidian, pitchstone, rhyolite, andesite and basalt, tuffs and breccias.

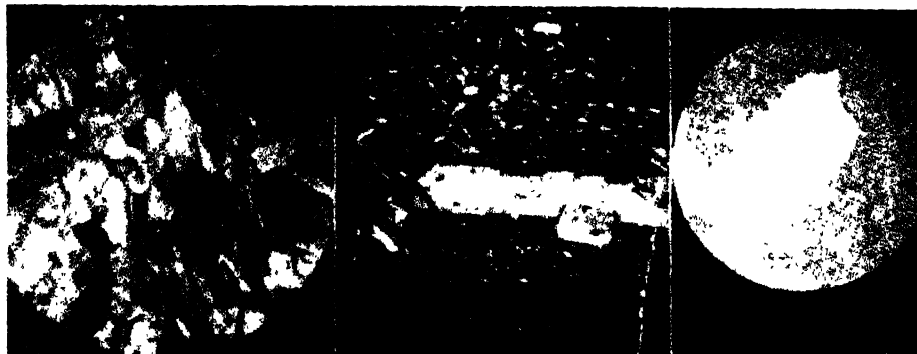
Intrusive rocks are those which were intruded into the earth's crust but did not reach the surface, although subsequent denudation of the cover may have since exposed them. They occur as batholiths, bosses, laccoliths, veins, sills, dikes and necks, and the commonest types of rock are granites, syenites, diorites, gabbros, peridotites, porphyries, dolerites, etc.

The particular name given to a rock depends upon the minerals contained in it.

the action of water, carbon dioxide and oxygen at ordinary temperatures and pressures. The chief minerals are quartz, mica, iron oxide, kaolin, calcite, chlorite, and such re-deposited crystals as salt, gypsum, barites, iron pyrites, etc. The stratified, sedimentary, aqueous and derived rocks may be classified into three groups—those formed mechanically, chemically and organically—

(i) *Mechanically formed*: such are conglomerates, grits, sandstones, clays, mudstones and shales; glacial debris, clays, moraines and erratics.

(ii) *Chemically formed*: such are kaolin, clay, calcareous tufa, calcite, siliceous sinter, salt, gypsum, fluor-spar, flint, ironstones



ROCK SECTIONS UNDER THE MICROSCOPE

Left: Syenite. Centre: Andesite. Right: Quartz Porphyry

Photos: I. F. Taylor

The chief minerals forming the mass of igneous rocks are: quartz, feldspars, pyroxenes, amphiboles, micas, olivine, nepheline, leucite, iron oxides and apatite.

Differences of type may be brought about (1) by differences in the liquid before crystallization, due to temperature and pressure; (2) by fractional crystallization; or (3) by assimilation of fragments of foreign rock and the interaction between solid and liquid materials. For example, granite which has assimilated shales may contain minerals such as andalusite, cordierite, etc., which are not usually found in normal igneous rocks.

Derived Rocks are the debris produced by denudation of igneous rocks or previously formed derived rocks. These rocks are usually found in more or less thin layers (strata) with roughly parallel upper and under surfaces. Many of them have been deposited as sediments under water and are therefore called aqueous or sedimentary; but others have been deposited by wind or by glacial action.

The derived rocks are composed of minerals of the types which have been able to resist

(iii) *Organic*: such are limestones, Tripoli earth (diatomaceous earth), peat, lignite, coal, anthracite, oil shale and some iron ores, and phosphatic nodules.

It is in the sedimentary rocks that most of the fossils are obtained, which enable the geologist to tell the age when the rocks were shaped and the conditions under which they were formed, whether lacustrine, estuarine, littoral or marine. The petrologist is particularly interested in the residue of heavy and unaltered minerals found in the sedimentary rocks. From a study of these and their condition, he endeavours to trace their place of origin and method of transport and deposition, and so reconstruct something of the ancient geography of the area where the rocks have been formed.

Metamorphic Rocks. The metamorphic rocks have all been altered in structure or mineral content by pressure or by heat. The pressure may have been produced by the weight of later formed strata, but more often by that folding of the strata which produced the great mountain chains. The heat may have been produced by pressure, by conduction from the hot interior, or by the

intrusion of igneous rocks with their accompanying liquids and gases.

The pressure and heat cause recrystallization, reorganization of minerals, and new structures.

The chief metamorphic rocks are the gneisses and schists and the more economically useful slates and marbles. The gneisses and schists usually have a banded, foliated or crystalline structure. Some of the slates are clays in which pressure has caused the particles to arrange themselves with their long axes all in one direction, thus producing good cleavage planes. Marble is a recrystallized limestone. Other metamorphic rocks resemble granites, and their original state is very difficult to ascertain.

PETRONIUS, *pet rō' nius*. A Roman satirist; dates of birth and death unknown. Tacitus gives a picture of a man clever, dissolute and unscrupulous, who became one of the chief intimates of Nero in the period of his debauchery. The *Feast of Trimalchio*, the largest extant fragment, is one of the wittiest contributions to the literature of the Silver Age. It is a comedy of manners giving a description of a dinner party given by a man of great wealth but poor connections. Another extant fragment of considerable merit is the *Matron of Ephesus*, which is, however, somewhat marred by coarseness of expression.

PETROPAVLOVSK, *pyet ro' pahv' löfsk*. Capital of Kamchatka (which, see).

PETTY OFFICER. In the Royal Navy, a rating of superior grade, corresponding with non-commissioned ranks in the Army and Air Force as follows—

<i>Navy.</i>	<i>Army.</i>	<i>Air Force.</i>
Chief Petty Officer	Squadron, Battery or Company Quartermaster Sergeant	Flight Sergeant
Sergeant	Colour Sergeant	
	Staff Sergeant	
Petty Officer	Sergeant	Sergeant

Chief Petty Officers and Petty Officers of the Seaman branch are so styled. In the case of other branches, the name of the branch is incorporated, as, for example (Chief) Petty Officer Telegraphist, Stoker Petty Officer, (Chief) Petty Officer Writer, Supply (Chief) Petty Officer. Some older titles, such as Master-at-Arms and (Chief) Yeoman of Signals, still survive. Artificers, i.e. Engine Room, Electrical and Ordnance Artificers, are broadly divided into two grades, Chief Artificers (e.g. Chief Engine Room Artificer) and Artificers. These grades are further subdivided into classes. Shipwrights are similarly graded. Chief Artificers and Shipwrights, and Artificers and Shipwrights of

the 4th class and upwards, rank as Chief Petty Officers. Artisans ordinarily rank as Petty Officers. They are not, however, given specific titles as such, but are rated according to their trade, e.g. Sailmaker, Blacksmith, Painter, Plumber. Artisans holding ratings equivalent to Chief Petty Officer have their titles prefixed by "Chief," e.g. Chief Blacksmith.

In the Merchant Service, certain members of the crew, such as the Boatswain, Carpenter and Quartermasters, are classified as Petty Officers.

PETTY SESSIONS, COURT OF, or COURT OF SUMMARY JURISDICTION. The lowest in the scale of English courts, but in the volume of its work and its influence on the lives of the people, perhaps the most important. Each county is divided into a number of petty sessional divisions, each with its court-house and its magistrates. All petty offences are triable by the Court of Petty Sessions, and many indictable offences can be dealt with summarily by this Court with the consent of the accused person. The maximum punishment which a Court of Petty Sessions can inflict is six months imprisonment with hard labour and a fine of £100. Apart from its criminal work, the Court has a wide civil jurisdiction in cases where no large sums of money are at stake, e.g. in settling disputes between husband and wife, landlord and tenant, and employers and workmen, and in connection with moneylenders, illegitimate children, lunatics, etc. It has also certain administrative duties in connection with the granting of licences (which see), the issue of pawnbrokers' and moneylenders' certificates, and the suspension and termination of the services of special constables. See CRIME (Criminal Law); JUSTICE OF THE PEACE, MAGISTRATE.

PETUNIA, *pe tú' nia*. A popular garden flower; the large bell-shaped blossoms



PETUNIAS

Photo: Sutton & Sons

have a great range of colours and crinkly petals. The species are native to South



PEWTER WARE

1. Guild tankard in silvered pewter cast with figures in relief after models by Peter Flötner. Probably Swiss, dating from the latter half of the sixteenth century. 2. English tea caddy dating from about 1730. 3. German christenbury dating from the early seventeenth century. 4. Mull-Horn, mounted in pewter, formerly silvered. English; early nineteenth century. 5. Plate, believed German, dated 1771. It is of silvered pewter engraved with scenes from the Book of Esther and was used by the Jews for conveying presents at the Feast of Purim. The inscriptions are German-Hebrew and one records the name of the owners Leah of Gallbach and his wife Pessale Auerbach. 6. German tankard, engraved on the drum *Maria Noergelin* and on the lid *M.F. 1646*. 7. Scottish communion flagon dated 1702. It is from Kilmadock, Perthshire.

Photos: Victoria and Albert Museum

America, and are widely grown in Europe and America, where many hybrids or mixed varieties have been cultivated. The leaves and stems are covered with long white hairs, and the blossoms are pure white or varying shades of purple, violet, rose and pink. They thrive best in rich soil and in sunny positions. Some of the finest varieties are grown from cuttings, but varieties true to seed are now well established.

Scientific Names. The petunia constitutes a genus in the nightshade family, *Solanaceae*. Most of the forms seen in the gardens are hybrids of *Petunia nyctaginisflora* and *P. violacea*.

PEWTER, *pū' ter*. A metallic alloy having tin as its principal constituent. The chief metals used in composition with the tin are copper, lead, antimony and bismuth. The proportions of the ingredients vary, from 75 to 90 per cent of tin being combined with 25 to 10 per cent of the other materials. As a rule, the larger the proportion of tin, the better the pewter. The finest pewter is made of tin and copper.

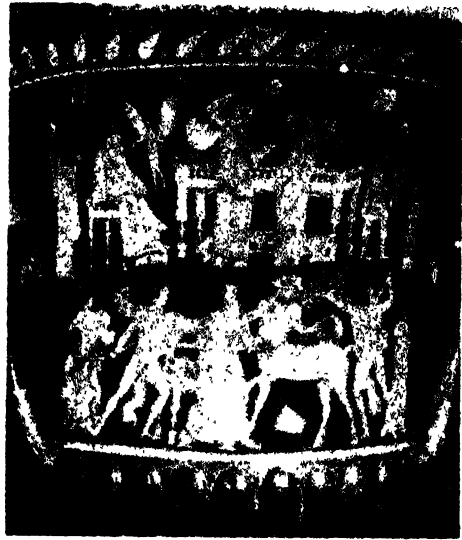
During the seventeenth and eighteenth centuries, pewter was widely used in England and continental Europe for domestic utensils, and to some extent for church vessels. It was introduced as a substitute for silver and gold. After the eighteenth century, pewter was gradually replaced by china and glassware.

Considerable care is required to keep pewter in good condition. It tarnishes easily and needs frequent polishing. It is easily scratched and may be ruined by injudicious cleaning. It is also subject to dents and breakage, and does not withstand a high degree of heat. See illustration on p. 3365.

PFENNIG, *pfen' sh*. A standard bronze coin in Germany, one-hundredth of a Reichsmark.

PHAEDRA, *fe' dra*. In Greek mythology, a daughter of Minos and sister of Ariadne. Though he had abandoned Ariadne, Theseus, in his old age, proposed for the hand of Phaedra and was accepted; but when the young bride came to Athens, she fell in love with his young son, Hippolytus. When he spurned her advances, she accused him to his father of insulting her. The old king prayed to Poseidon to punish his ungrateful son, and Poseidon answered his prayer, drowning in his waves the young prince, who was at that time driving his chariot by the seashore. Phaedra, in a fit of remorse, hanged herself. Her story is the theme of Euripides' *Hippolytus* and Racine's *Phèdre*.

PHAEDEUS, *fe' drus*. A philosopher and a fabulist in ancient Rome. The philosopher died in 70 B.C., who was of the Epicurean school. Cicero appears to have been influenced by him, especially in his *De Natura*



PHAEDRA'S LOVE-SICKNESS
Decorations on a vase in the British Museum.

Deorum. The fabulist, apparently a manumitted (freed) slave of Augustus, is mainly remarkable as the author of a collection of 97 fables, written in iambic verse. While style and versification are correct, they are very uninspired work, mostly adaptations of Aesop, whom, of course, they do not approach in merit.

PHAETHON, *fa' eth on*. In Greek mythology, the son of Helios and Clymene. Clymene had refused to tell her son who his father was until the boy, shamed by his companions, made an imperious demand. When he learned that he was actually the child of the sun god, he journeyed to the palace of the sun and asked of his father, as a sign of his birth, permission to drive the chariot of the sun for one day. After cautioning him to drive slowly, and to take care to go neither too high nor too low, Helios reluctantly watched him depart. The rash boy used his whip on his fiery steeds, which rushed up the heavens, dragging the chariot after them. They went so high that the earth beneath them almost perished with cold; then they hurtled down so close to the ground that vegetation was scorched, rivers were dried up, and rocks were split. Gaea (Earth) called on Zeus for help, and he hurled his thunderbolts at the boy, who fell from the chariot and was killed. The name phaeton is also applied to a kind of open four-wheeled carriage.

PHALANGER, *fd lan jer*. Members of a family (Phalangeridae) of small woolly-covered marsupials. Some phalangers are



STRUCK BY POITS FROM TREE
Photo Mansell

able to glide long distances from tree to tree with the aid of a thin membrane which stretches along the side of the body between the fore and hind limbs. These "flying phalangers do not, in fact, fly, but the membranes are useful in that they enable them to make very considerably longer leaps than if they were without them. There are three species of flying phalangers, none of which is to be found outside Australia, New Guinea or nearby islands. Their principal home is the mainland of Australia. Though many species of phalangers are without the membranes and so are unable to make the phenomenally large jumps, all species are arboreal, i.e. they live in trees, and are in other ways specially adapted to this kind of a life. For example, the *custuses*, which, unlike most varieties, are not to be found in Australia, have prehensile tails.

PHALANGES, *fā lan' jeez*. See **HARRY FOOT**.

PHALANX, *fal' anx*. The order of battle in which the ancient Greek infantry was formed. The legions of Rome afterward adopted the same formation and proved invincible. The phalanx was sometimes a triangular-shaped wedge which was driven through the enemy's ranks; sometimes it was a solid square which resisted all attacks, but was not so mobile as the wedge. In a square it consisted of eight to

sixteen ranks, the men being armed with spears from 8 to 14 ft. in length, and having their bodies protected by large shields.

PHALAROPE, *fal' a rôpe*. A bird belonging to the same family as snipes and sandpipers; they are typically northern birds. There are two species found in Britain; the Red necked Phalarope is only known to breed in the far north of the British Isles; the Grey Phalarope is a winter visitor, breeding only in the vicinity of the Arctic region.

PHANEROGAMS, *fan' e o gamz*. This was the name applied by earlier botanists to that division of the plant kingdom which is made up of flowering plants. The distinguishing characteristics of phanerogamous plants are that they possess flowers with stamens, and ovules that develop into seeds with embryos. Plants that reproduce by spores were called *cryptogams* by the earlier botanists. See **CRYPTOGAMS**.

PHANTASY. See **FANTASIA**.

PHARAOH, *fan' e*. The Biblical title assumed by the kings of Egypt, ten of whom are mentioned in the Old Testament. The Pharaoh of the time of Abraham cannot be identified. The Pharaoh of Joseph was probably of the Hyksos line, and, being himself a "Shepherd King," was friendly to the wandering Hebrews. The Pharaoh of the Oppression, "the new king that knew not Joseph," has been identified with Rameses



MERENPTAH

No longer believed to be the Pharaoh mentioned in *Exodus*. He is here shown playing draughts.

II, and the Pharaoh of the Exodus with Merenptah, son of Rameses II. Among others mentioned are the Pharaoh who was

the father-in-law of Solomon, the Pharaoh who was the opponent of Sennacherib at the time of Hezekiah, and Pharaoh Necho, who invaded Palestine and was overthrown by Nebuchadnezzar.

PHARAOH'S RAT. See *ICHNEUMON*.

PHARISEES, *far'ri seez*. In the third century B.C. the time of the Maccabees (which see), the most religious among the Jews formed themselves into a sect to defend the Jewish religion against heathenizing persecution. They took the name of "Pharisees" (separated), and were, by the time of Christ, the strongest religious sect in Judea. Originally noted for heroism and real piety, they had degenerated, and are denounced by Him for formalism and hypocrisy. The Pharisees held themselves apart, not only from the heathen but from the other Jews as well, and considered that they alone were the true followers of the teachings of the patriarchs. To the written law of the Pentateuch they added the oral law, supposed to complete and explain the original statutes. It made rules for the minutest details of daily life, such as eating, drinking and washing of hands, and for tithing, fasting and Sabbath observance, till it put upon the whole people "burdens too grievous to be borne." The Pharisees believed in the resurrection of the dead and in the existence of angels and spirits. In all of these teachings they were bitterly opposed by their rival sect, the Sadducees, who were of the official class and were materialistic in their philosophy.

After the Christian Church had organized itself independently of Judaism, the Pharisees withdrew themselves still more. The Talmud, still recognized as authoritative by Jews of all nations, was the painstaking work of Pharisees during the early Christian centuries. Gamaliel and his pupil Saul (Saint Paul) were of this sect. See *SADDUCEES*.

PHARMACOLOGY, *far mā kol' o je*. The study of the action of drugs on the body in health and disease is closely concerned with one of the oldest of human efforts, the giving of remedies for the relief of disease. Knowledge was obtained by trial and error; certain plants, such as poppy, belladonna, foxglove and others, as well as some minerals, as Epsom salts, soda, or Glauber's salt, were found to produce certain results. Pharmacology proper began during the nineteenth century with the rise of chemistry, when the active part in plant and mineral which affects living tissue could be analysed and isolated in pure form, its composition determined, and its precise effect accurately measured.

In another direction the study of chemistry, especially of organic chemistry, led to

an advance in pharmacology by the discovery of new chemical compounds, which, as far as we can tell, came into existence now for the first time. The first of these organic compounds, synthetically produced, to be brought extensively into therapeutic use were ether and chloroform. These two chemical substances, together with the discovery of antiseptics, wrought the greatest revolution that has ever taken place in the history of medicine.

Thus pharmacology is dependent on chemistry and biology, being the study of the action of drugs on living things, whether plant or animal. The branch of pharmacology relating to poison is *toxicology*. Nearly all chemical agents in large enough amounts are harmful to living tissue. *Pharmacy* is concerned with dispensing drugs to the sick.

When a physician knows exactly how drugs in certain doses will act on living tissue, he may use them for the following purposes:—

(1) *To cure disease*, by removing the specific causative agent, as when mercury is used to combat syphilis, or quinine against the parasites causing malaria, or carbon tetrachloride against hookworm, etc.

(2) *To relieve a diseased condition*, as digitalis in certain heart diseases, insulin in diabetes mellitus, liver extract in pernicious anaemia, ephedrine in asthma, and so on.

(3) *To diagnose diseased conditions*, as the halogenated phthalein dyes, barium salts, or iodized oils in X-ray examination of the body cavities.

(4) *To prevent disease*, as various antiseptics for skin and instrument sterilization in surgery, or iodine compounds to prevent simple goitre, or cod-liver oil to prevent rickets in infants.

By investigation of the relation of chemical constitution to pharmacological action, important new chemicals have been produced which more nearly approximate to the ideal of high therapeutic efficiency with low toxicity than do those from natural sources. This sort of study was greatly advanced by Paul Ehrlich (1854-1916).

PHARMACOPOEIA, *far mā ko pe' a*. A book containing tables of drugs, a statement of the methods for their preparation, the doses in which they may be taken, and the standard of strength and purity. The volume is compiled usually under highest professional, sometimes governmental, authority, by men who have wide knowledge of the subject. The first book of the kind was the *Nuremberg Pharmacopoeia*, published in Germany, 1542. The governments of practically all civilized nations now authorize the preparation of national pharmacopoeias, which are continually revised. The *British*

Pharmacopoeia is issued by the General Medical Council.

PHARMACY, *far' mā se*. The science and art of preparing and combining drugs in a suitable form for administration. The duties of the pharmacist are extensive. He must be well versed in chemistry, botany, biology, microscopy and other studies, and must keep himself informed on all legislative developments connected with drugs. A book called a *pharmacopoeia* is published in most civilized countries, describing all drugs in common use, and laying down exact instructions as to their preparation. Much effort has been taken to attain to international uniformity in the preparation of drugs, but it has not yet been found possible to produce an international pharmacopoeia.

PHAROS, *far' ōs*. A rocky island off the African coast, formerly celebrated as the site of the first lighthouse, erected by Ptolemy II (368, 247 B.C.) and long regarded as one of the Seven Wonders of the World. When the city of Alexandria was founded by Alexander, he caused the island to be connected with the mainland by a mole or causeway seven furlongs (1540 yards) in length. The great lighthouse, over 400 ft. high and resting on a base 100 ft. square, stood for nearly 1000 years, it was destroyed by an earthquake in the fourteenth century. The peninsula is now occupied by part of the modern city of Alexandria.

PHARSALIA, *far say' lia*, BATTLE OF. See ANTONY, MARK; POMPEY.

PHARYNX, *far' ynx*. The name given to the short, tube-like recess at the back of the mouth. It forms the connecting link between the mouth and the oesophagus, and also between the back of the nose and the larynx. The nasal passage opens from above into the pharynx. This part is called the *naso-pharynx*, and it leads directly into the upper part of the larynx.

The opening into the larynx is guarded by a flap of tissue called the *epiglottis*. The opening of the nasal passages into the pharynx is guarded by another flap of tissue called the *uvula*. This can be seen hanging down centrally in the back part of the mouth when the mouth is opened wide and the tongue protruded. By means of these two flaps of tissue, the respiratory openings into the pharynx may be entirely shut off, and this is what happens when the pharynx is being used for the passage of food. Sometimes, however, if we breathe inward while eating, the guards to the respiratory passage-way do not work quickly enough, and food enters the windpipe, which makes us choke. Normally, when we take food into the mouth, the act of swallowing causes the uvula to be pressed up and back against the pharyngeal

wall, and the epiglottis closes over the larynx so that there is no opening for the food except that leading into the oesophagus. This opening is just behind that leading into the larynx.

There are muscles in the pharyngeal wall which alternately contract and relax and help to urge the food on toward the oesophagus. The average length of the pharynx is about 5 in. The Eustachian tubes open into the pharynx, thus connecting it with the middle ear.

Inflammation of the pharynx is called *pharyngitis*.

PHEASANT, *feez' ant*. One of a group of brilliantly coloured birds belonging to the same family as the domestic fowl and the peacock. The word "pheasant" is derived from



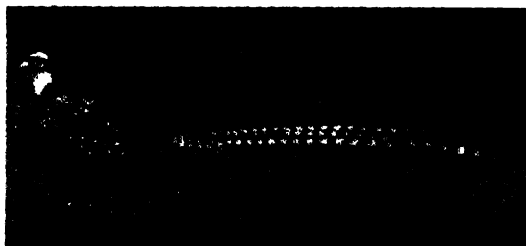
SILVER PHEASANT
L'holo: Photopress

Phasis, the name of a river in Colchis, on the eastern shore of the Black Sea. In this region pheasants have always been found in large numbers.

Two of the best known species are the so-called *English pheasant*, brought to England supposedly by the Romans, and the *ring-neck*. These birds are natives of Asia Minor and of China, respectively. The English pheasant is bred in large numbers in England preserves as a game bird. The cocks of this species are most brilliantly coloured, the head and neck being a bright green, the under parts bronze-red, and the flanks reddish-brown tipped with blue-black; the long, tapering tail is grey, marked with bands of black. Female birds are of a yellowish-brown colour, with markings of a darker brown. The cocks are about 3 ft. long, fully half of this length being taken up by the tail, and the females are about a foot shorter. Ringneck pheasants have as a distinctive marking a white ring about the neck, but their plumage shows a similar brilliant combination of red, purple, green and black.

The common hybrid of these two species

is known in England as the *English ringneck pheasant*. Pheasants nest on the ground, laying ten or more olive-buff eggs in a hollow



REEVES' PHEASANT, NATIVE TO CHINA

among the leaves. Berries, seeds, worms and insects form their food.

Among other well-known species are the *golden pheasant*, so called from its golden-yellow crest and bright-yellow breast; the *Chinese silver pheasant*, a bird whose white upper parts are delicately marked with black lines; and the *cared pheasant* of Central and Eastern Asia, whose name refers to the long white tufts of feathers growing out from the ears.

The pheasant shooting season in



GOLDEN PHEASANT



COMMON PHEASANT ON NEST

Photo: John Kauten

Britain extends from 1st October to 31st January. Till about mid-November, the birds are shot over dogs (pointers and setters or spaniels); after that date, they are driven on to the guns by beaters.

Scientific Names. Pheasants belong to the family *Phasianidae*. The English pheasant is *Phasianus colchicus*; the Chinese ringneck, *P. torquatus*.

PHEIDIPIDES, *fe dip' id eez*. The hero of Marathon (which see).

PHENACETIN, *fen as' e tin*. A headache and fever remedy belonging to the coal-tar group, in which are included antipyrine and

acetanilid. All of these medicines have similar effects, but phenacetin is the least depressing of the three.

Overdoses of phenacetin and similar preparations cause excessive lowering of the temperature, coldness of hands and feet, and have a depressing effect on the heart.

(The name is derived from Greek *phainos*, shining, formerly applied in general to by-products obtained in making coal gas.)

PHENOMENALISM. A philosophical term with rather indefinite meanings. In the main it may be said to describe the doctrines of

those thinkers who maintain that knowledge consists entirely of objects and events which can be described as phenomena, i.e. appearances in space perceived by the senses. Some schools, of which Heraclitus was the earliest exponent, have regarded these appearances as the only reality, others believe in an objective world of reality as well, of which the phenomena are appearances, this ultimate world being beyond knowledge. In some cases even the phenomena are identified with the senses which perceive them, these senses being the only reality capable of human knowledge.

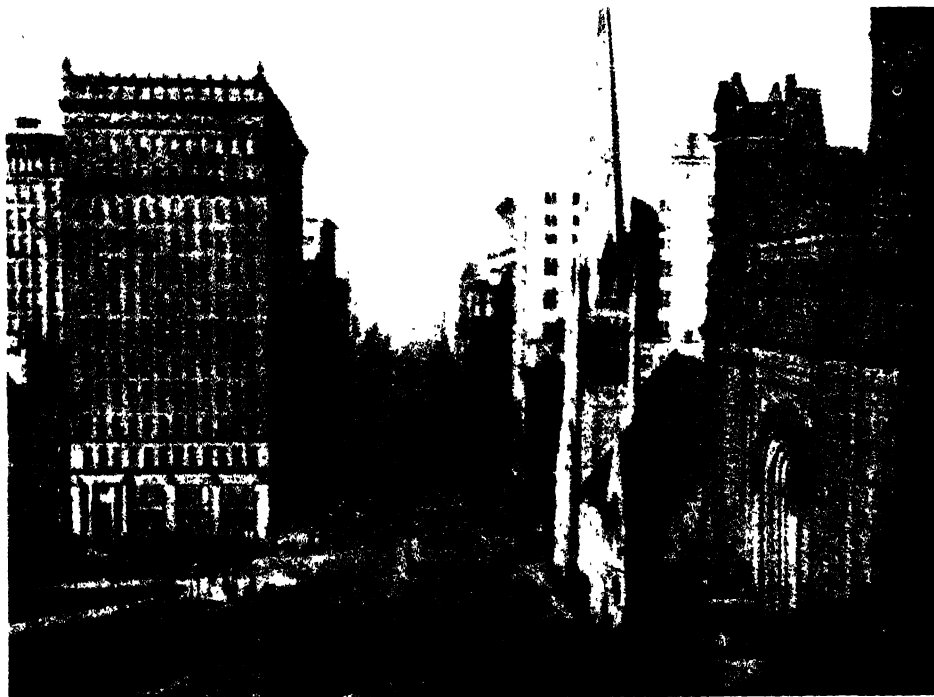
PHIDIAS, *fid' ias* (c. 490-c. 432 B.C.). A sculptor of ancient Greece. From descriptions of ancient writers, we know that his statues and sculptures had majesty, dignity and beauty. Phidias was born in Attica, and is said to have started his career as a painter. However, he soon turned his attention to sculpture, reaching the highest development in his career under the patronage of Pericles, who commissioned him to execute many of the finest statues to be erected in Athens, and to superintend the public works of the city. Foremost among

his colossal statues in ivory and gold were the celebrated "Zeus" at Olympia, and the "Athena" of the Parthenon at Athens. His most famous bronze works were the "Athena" on the Acropolis at Athens, noted for its size, and the Lemnian "Athena." Phidias, accused of impiety and of theft, was later thrown into prison.

PHILADELPHIA. The largest city in Pennsylvania, U.S.A., founded in 1682 by William Penn. It is the third largest municipality in the United States, and the eleventh

school. There are professional schools at the Drexel Institute of law, dentistry, medicine and pharmacy; some of them are independent, and some are branches of the university. Other schools include Temple University, founded in 1884; Pennsylvania Academy of the Fine Arts; schools for the deaf and the blind, and the School of Design for Women.

Besides the botanical, zoological and art collections in Fairmount Park, Philadelphia has several notable museums. The Philadelphia Commercial Museum houses a unique



MAIN STREET IN PHILADELPHIA

in the world. A great industrial city, it is the textile centre of America, and a commercial port of first rank. Its area is 129.7 sq. miles.

In the early years of the city, English Quakers and Germans were most numerous. Immigration, especially after 1850, added greatly to the growth of population; the figure in 1930 was 1,950,961. About 60 per cent of the white population is of foreign parentage, principally English, Irish, German, Russian and Italian.

Besides maintaining an excellent public school system, Philadelphia encourages higher education. In West Philadelphia is the University of Pennsylvania. It was established in 1740 as a charitable secondary

collection of raw materials and manufactured products from every country in the world.

Philadelphia is third to New York and the Chicago industrial district in the number and importance of its manufacturing enterprises. It has the largest factories in the world producing locomotives, tramcars, and saws. The famous hat-making firm of Stetson has its headquarters here, as have several distinguished publishing houses.

Though it is a hundred miles from the ocean, over 11,000 vessels enter and clear the harbour at Philadelphia in a year, representing nearly a score of nations.

PHILAE, *fi' le*. A small, uninhabited island in the River Nile, about 5 miles south of Aswan, above the First Cataract. It is a



FAIRMOUNT PARK, PHILADELPHIA

Main entrance, with Logan Fountain in the background

granite rock 1000 ft. long and 500 ft. broad, and on it stand some of the most interesting ruins of Egypt. The building of the dam on the Nile between Aswan and Philae caused the submersion of the famous temple of Isis. See EGYPT.

PHILATELY. See STAMP COLLECTING.

PHILEMON, *fil e' mon*. See NAUCIS AND PHILEMON.

PHILEMON, EPISTLE TO. The shortest of four letters written by Saint Paul during his captivity. It is addressed to Philemon, a fellow-worker at whose house the Christians of Colossae held their meetings. See PAUL, SAINT.

PHILIP II, KING OF MACEDON (382-336 B.C.). He was the youngest son of Amyntas II, was born at Pella, and in his youth spent several years as a hostage at Thebes. While there he had the opportunity to obtain from Epaminondas and Pelopidas a knowledge of military science, statecraft and oratory. In 359 B.C., on the death of his brother Perdiccas, Philip was made regent for the infant heir, Amyntas, but he soon set aside his nephew's claims and made himself king. Various claimants to the throne encouraged disturbances within the kingdom, while it was threatened from without by the Illyrians, Athenians and other enemies; but the young king overthrew the pretenders, defeated the Illyrians, bought off the Athenians, and within two years was established on the throne.

Ascendancy over Greece. Philip's aim was to become master of all Greece; his career of aggression was begun by attacking the Greek towns on his border. Amphipolis was captured in 357, Pydna and Potidaea in the

next year, and he then took the Thracian town of Crenides, which he renamed Philippi, and which gave him control of the rich gold mines of Thrace. In 354 Methone submitted, and in 347 Olynthus, to which Athens had sent aid too late. Meanwhile, he had advanced as far south as Thermopylae, but found it too strongly guarded by the Athenians, and turned back. In 346 the Thebans appealed to him for help against the Phocians, who had held the sacred city of Delphi for many years, and when he proved successful, he was given the place in the Amphictyonic Council which had previously belonged to Phocis. This was in recognition of him as a Greek among Greeks.

Demosthenes as Antagonist. At Athens, Demosthenes perceived the plans of the Macedonian king, against whom he delivered his famous *Philippics*. Philip's attentions during the years 345-339 seemed confined to Thrace, where with great difficulty he established his supremacy. In 338 B.C. he again entered Greece, this time at the request of the Amphictyonic Council, which desired his help against the Locrians. Now Demosthenes succeeded in stirring up Athens to a sense of danger, and in persuading Thebes to join in a defensive league; but the allied armies were completely defeated by Philip at Chaeronea in August, 338, and Greek independence was at an end. With all Greece in his control, Philip began to plan an invasion of Persia, but in the summer of 336 he was assassinated by a Macedonian youth.

Estimate. Philip's fame has inevitably suffered because of the greater glory of his son, Alexander the Great, but he stands out as a king who achieved much in face of great



OLD "HIGH STREET"

A reproduction of the principal street of Philadelphia about 150 years ago. This is preserved as a part of League Island Park.



INDEPENDENCE HALL, PHILADELPHIA

One of the most historic structures in the United States; the main building was completed in 1734 and the bell tower added in 1751.

difficulties. His dream of a Greek empire, in place of the Greek city-states, was in advance of his age, and the means by which he secured it, both military and diplomatic, were masterly. He brought his army to a high state of efficiency and developed the famous "Macedonian phalanx," which did such effective work in the campaigns of his son. In the eyes of historians his fame has

suffered on account of the contempt in which he was held by contemporary Greek authorities as a "barbarian." See DEMOSTHENES; MACEDONIA.

PHILIP. The name of several French kings. Of these, Philip II, IV and VI are of greatest interest and importance.

Philip II (1165-1223), known as **PHILIP AUGUSTUS**, was one of the greatest of the early French rulers, and the first to bring France into a commanding position in Europe. He was the son of Louis VII and became king in 1180. He cherished a statesmanlike wish to establish a centralized monarchy

in France. By taking the part of the sons of Henry II of England in the risings against their father, Philip forced the English king to do him homage for his possessions in France; and when Richard I (the Lion-Hearted), Henry's son, came to the throne in 1189, the two monarchs caught the spirit of the Crusades and set out together for the Holy Land.

As they quarrelled on their way to Palestine, Philip returned to France and intrigued with the Emperor Henry VI against Richard, who was taken and imprisoned on his way

home. Philip also formed an alliance with John, Richard's brother, and attacked Richard's possessions in Normandy. He met with small success, and Richard's death in 1199 ended the war. Almost immediately, however, war broke out with John, Richard's successor. The capture by Philip of Château Gaillard marked virtually the subjection of Normandy and the break-up of the Angevin Empire. Eventually the royal power was established over other too-powerful vassals: Brittany, Anjou, Maine, Touraine and Poitou. In 1214 Philip was called upon to face a powerful coalition composed of the Count of Boulogne, the Count of Flanders, the Emperor Otto IV and John of England, but at Bouvines he overwhelmingly defeated them, and effective opposition to his power was at an end.

Philip was also a great statesman. Reforms in administration strengthened the hold of the central government on the people; the rights of the Church in France were upheld against Papal claims. Philip was married three times—first to Isabella of Hainault, who died in 1190, then to Ingeborg of Denmark, whom he repudiated soon after his marriage, and last to Agnes of Meran. The Pope, however, refusing to sanction this last marriage, excommunicated him, and made him recall Ingeborg.

Philip IV (1268-1314) was called **THE FAIR**, because he was, as a contemporary



PHILIP II, KING OF FRANCE
Photo: Mansell



PHILIP IV, KING OF FRANCE
Photo: Mansell

Florentine historian said, "the handsomest man in the world." He succeeded his father, Philip III, in 1285. The most noteworthy event of his reign was a contest with the Pope.

France needed money, and new taxes were accordingly levied, some of which fell upon the clergy; but in 1296 Pope Boniface VIII issued a bull forbidding anyone to tax the clergy without Papal sanction. Philip retaliated by decreeing that no metals should be exported from France, and the Pope at once submitted, as this would have deprived him of a large sum yearly. In 1301, however, trouble broke out again. Boniface issued another bull making most extravagant claims for the Papacy, and Philip, to make sure of the support of the people, summoned the first States-General in the history of France.

Philip's counsellor, Nogaret, hatched a plot to seize the person of the Pope, who died immediately afterward, and after the brief reign of Benedict XI, Philip made his own candidate Pope as Clement V. The Papal residence was transferred from Rome to Avignon, and thus began the seventy-year period of French control of the Papacy.

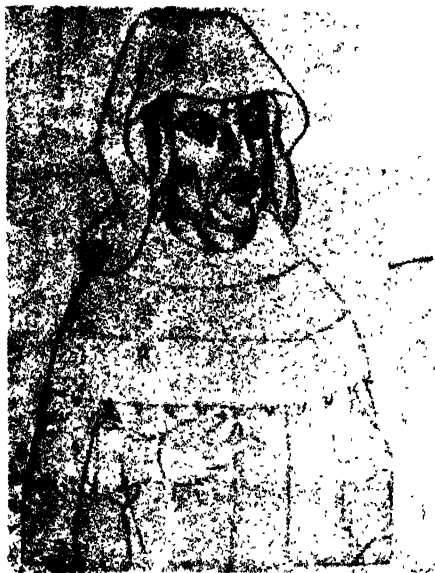
In order to obtain money for the increasing demands of the state, Philip suppressed the Order of the Knights Templars. Condemned by the Inquisition, many were burned at the stake. The property of the Order was confiscated. Early in his reign he came into conflict with Edward I of England, whose territory of Guienne he seized. He then turned against the Count of Flanders, but was decisively defeated at Courtrai. The marriage of Philip's daughter Isabella to Edward II of England led eventually to the claim of Edward III to the French crown.

Philip VI (1293-1350), founder of the dynasty of Valois, was a nephew of Philip IV. He came to the throne in 1328, on the death of his cousin, Charles IV. This led to a contest with Edward III of England, who, as a nephew of Charles IV, insisted on an interpretation of the Salic Law favourable to his own claims. Since the defeat of Philip IV by the Flemish cities at Courtrai in 1302, the French nobles had been anxious for revenge, and in 1328 Philip led them to victory at Cassel. Relations with England grew constantly more unfriendly, and in 1337 the Hundred Years War broke out. In 1340 the French fleet was defeated at Sluys, and six years later occurred the complete rout of the French in the Battle of Crécy, the first important battle of the Hundred Years War (which see).

The chief feature of Philip's internal government was its extravagance. In the latter part of his reign, France was swept by the pestilence known as the Black Death.

PHILIP. The name borne by several kings

of Spain, two of whom were of special importance.



PHILIP VI, KING OF FRANCE
Photo: Mansell

Philip II (1527-1598) was the only son of the Emperor Charles V and Isabella of Portugal. He succeeded to the throne in 1556. He grew up a cold, one-sided man, with no sympathy for those whose religious convictions differed from his own. His rule was characterized by one object, namely, to stamp out opposition to the Roman Catholic faith.

He first married Maria of Portugal; after her death, Mary, Queen of England, became his wife. The English, however, received him coldly and refused to help him in the war he had provoked with France, though the Queen sent him supplies and troops. Mary died in 1558, and in 1559 he married Elizabeth, daughter of Henry II of France. On her death, he entered into a fourth marriage with Anna, daughter of Emperor Maximilian II. Queen Elizabeth of England refused his proffer of marriage.

The reign of Philip II marks the beginning of the downfall of Spain and the loss of Spanish power at sea. The Netherlands, one of the most valuable possessions of Philip, revolted, and after a struggle lasting nearly thirty years threw off the Spanish yoke.

Drake's men destroyed the mighty Armada he sent against them in the spirit of a Crusader in 1588, and the power of Spain as a maritime nation was shattered. Philip

was more successful against the Turks; Portugal was conquered, but the commerce of Spain had suffered so terribly that the country never recovered.

Philip was quite incapable of curing the blight which was reducing Spain to poverty and decay. Agriculture was ruined by the expulsion of the Moriscos. Industry was strangled by sumptuary laws, even while

which were designed to destroy any possibility of the union of France and Spain, Charles II left the crown of Spain to Philip by will, and the latter was proclaimed king in 1700. This led to the War of the Spanish Succession, with France and Spain allied against England, Holland, Austria, Prussia, Denmark, Hanover, Portugal and Savoy. In 1713, by the Treaty of Utrecht, Philip was recognized as king, but Spain had to give up Gibraltar, Minorca, Sicily, the Netherlands and Naples.

Philip married, first, Marie Louise of Savoy, who died in 1714. His second wife, Elizabeth Farnese of Parma, caused trouble throughout Philip's reign. Her intrigues, combined with the plans of her favourite, Alberoni, dragged Philip into entanglements he had neither the wit to avoid nor the ability properly to master. The partial recovery of material prosperity in Spain in fact owed little to him.

PHILIP. The name of two dukes of Burgundy.

Philip the Bold (*le Hardi*), Duke of Burgundy (1342-1404). The son of King John II of France, he earned his reputation for valour at the Battle of Poitiers (1356). He was the first peer of France, and during the minority of his nephew, Charles VI, and later during his madness, he became coregent with his brothers. He had much trouble with the Flemish communes, who were in continual revolt against the Count of Flanders, whose heiress Philip had married. He eventually succeeded to the Countship, and concluded a Franco-Burgundian alliance directed against England. Philip was a far-seeing statesman whose object was to build up an independent monarchy. He was a great patron of the arts, and at Dijon, arose an important school of sculpture.

Philip the Good, Duke of Burgundy (1396-1467). He succeeded his father, who had been assassinated near Paris with the connivance of the Dauphin, in 1419. In revenge, Philip made common cause with the English, with whom he concluded the Treaty of Arras. In 1420 he accepted the Treaty of Troyes, whereby Henry V of England was recognized as heir to the French crown. Difficulties arose over an attempt of the Duke of Gloucester to take possession of territories of his wife Jacqueline of Hainault, succession to which was claimed by Philip. Reconciliation with France followed, resulting in the loss of the English possessions in France. Philip ruled over a large territory stretching from the North Sea to the Lake of Geneva. The Duke was a lover of letters, and on the occasion of his marriage with Isabel of Portugal founded the Order of the Golden Fleece.



PHILIP II, KING OF SPAIN
(National Portrait Gallery)

Court expenditure was on a lavish scale. Land was tied up in Church entail, and the large number of religious holidays hampered commerce. But while Philip II allowed Spain to sink deeper into economic chaos, he was successful in uniting the nation politically, and in centralizing authority in the hands of the monarch.

Philip V (1683-1746) was the first of the Spanish Bourbon dynasty. He was the son of the Dauphin Louis and Maria Anna of Bavaria, and grandson of Louis XIV and Maria Theresa, sister of Charles II of Spain. Notwithstanding the Partition Treaties,

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